

MECHANICS • AUTOS • HOME IMPROVEMENTS

# POPULAR SCIENCE

May 35c

MONTHLY



**Dream Highways  
for Dream Cars**

PAGE 140

McCall

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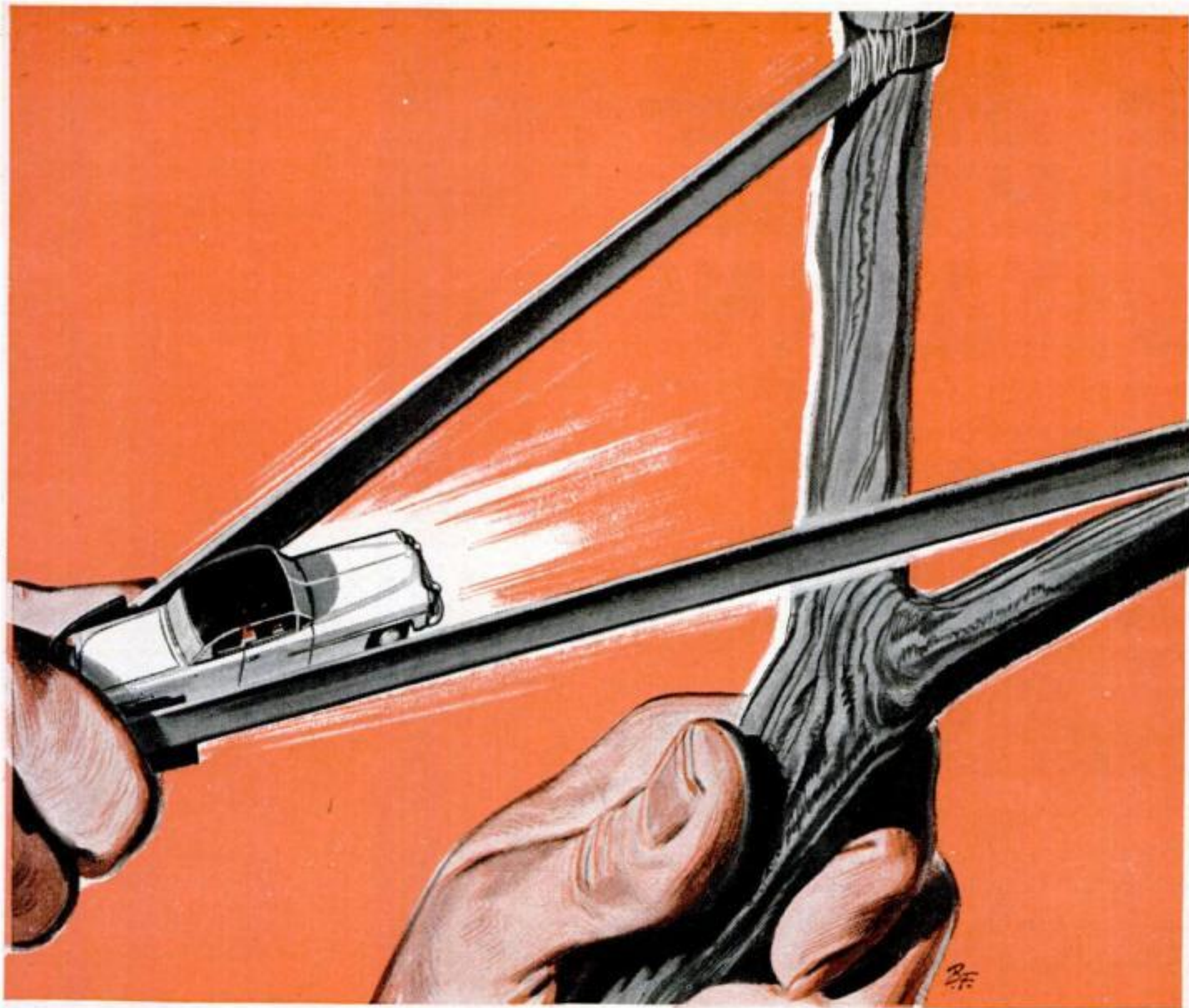
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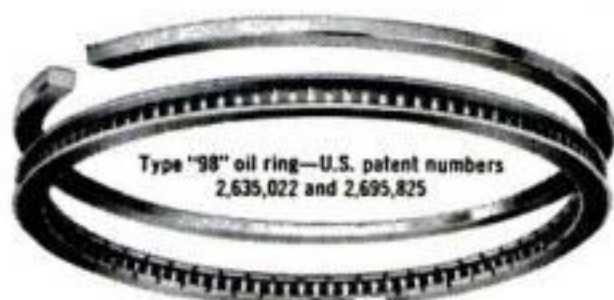
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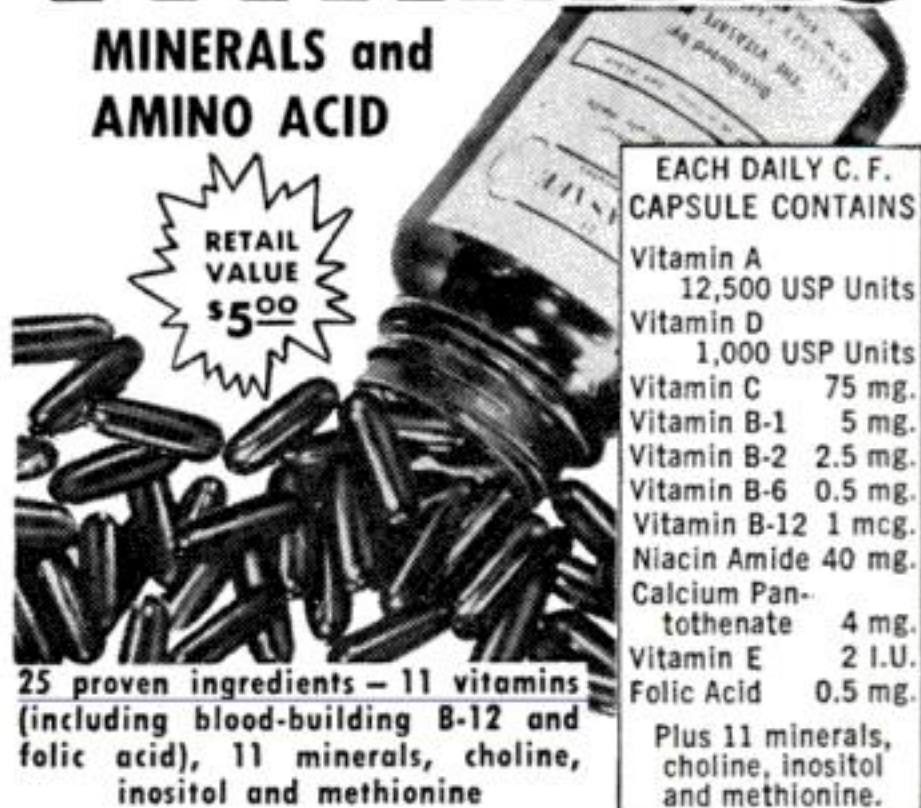
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### ART

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- ☐ Commercial Art
- ☐ Fashion Illustrating
- ☐ Magazine Illustrating
- ☐ Show Card and Sign Lettering
- ☐ Sketching and Painting

### AUTOMOTIVE

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- ☐ Auto Elec. Technician
- ☐ Auto-Engine Tune Up
- ☐ Automobile Mechanic

### AVIATION

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- ☐ Aircraft & Engine Mechanic

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- ☐ Retail Business Management
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- ☐ Traffic Management

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- ☐ Chemical Engineering
- ☐ Chem. Lab. Technician
- ☐ General Chemistry
- ☐ Natural Gas Prod. & Trans.
- ☐ Petroleum Engineering
- ☐ Plastics
- ☐ Pulp and Paper Making

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- ☐ Highway Engineering
- ☐ Reading Struct. Blueprints
- ☐ Sanitary Engineering
- ☐ Structural Engineering
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His friends have him pegged—"strictly juvenile." They have an expression—"Careless driving is kid stuff." That's him.

If he only knew. He'd wise up and drive right.

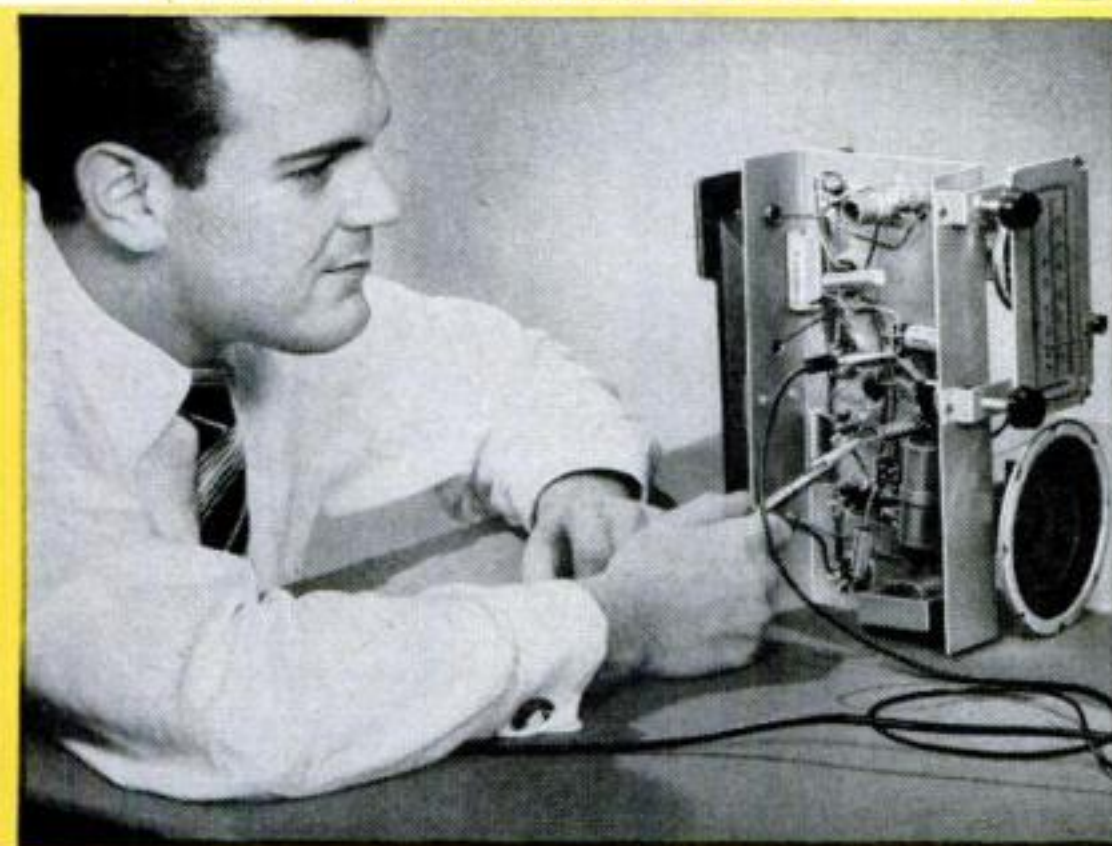


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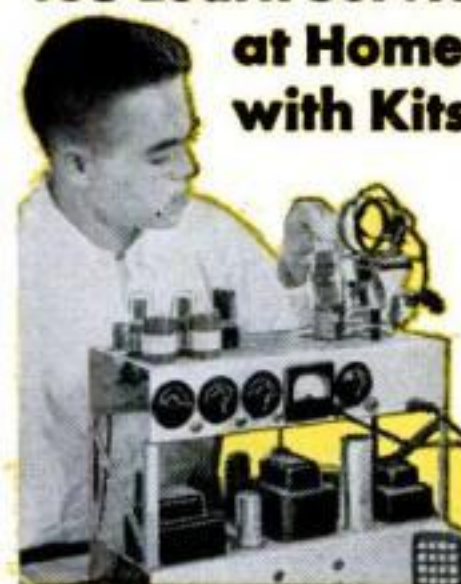
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# Letters



## Warning Lights vs. Gauges

Our request for readers' opinions on the use of warning lights [Letters, Feb., p. 18] brought in so many interesting letters that we decided to award four prizes instead of two. The writers of the following letters each get a \$25 U.S. Savings Bond.

### Ode to the Easy Life

When I turn the key to right,  
And the telltales both do light,  
Then I greet the brave new day with ecstasy;  
For I know the battery's battlin'  
To start my flivver rattlin'  
When I put a bit more pressure on the key.

No more thought to pounds of pressure,  
No more amps to hamper pleasure,  
No more needles wiggling, wagging to and fro.

So I press a little more,  
And the motor starts to roar,  
And the telltales both blink out to let me go.

In the days of gauges, dials,  
With their complicated wiles,  
To figure out the moment opportune  
To drive out in my car,

With the oil and amps at par,  
I sometimes reported for work at noon!  
LEW WILLIAMS, Columbus, Ohio

### Fine for Morons

I'm for telltales but they should not be red. I suggest beige, mauve or some other color to match the upholstery.

What opponents to telltales don't realize is that the do-it-yourself philosophy is becoming obsolete in driving cars. This obsolescence started years ago with the automatic spark advance; then came the automatic choke, the hill-holder, the warning light to tell you that your emergency brake is still on, and the automatic shift.

Present-day cars are designed for morons

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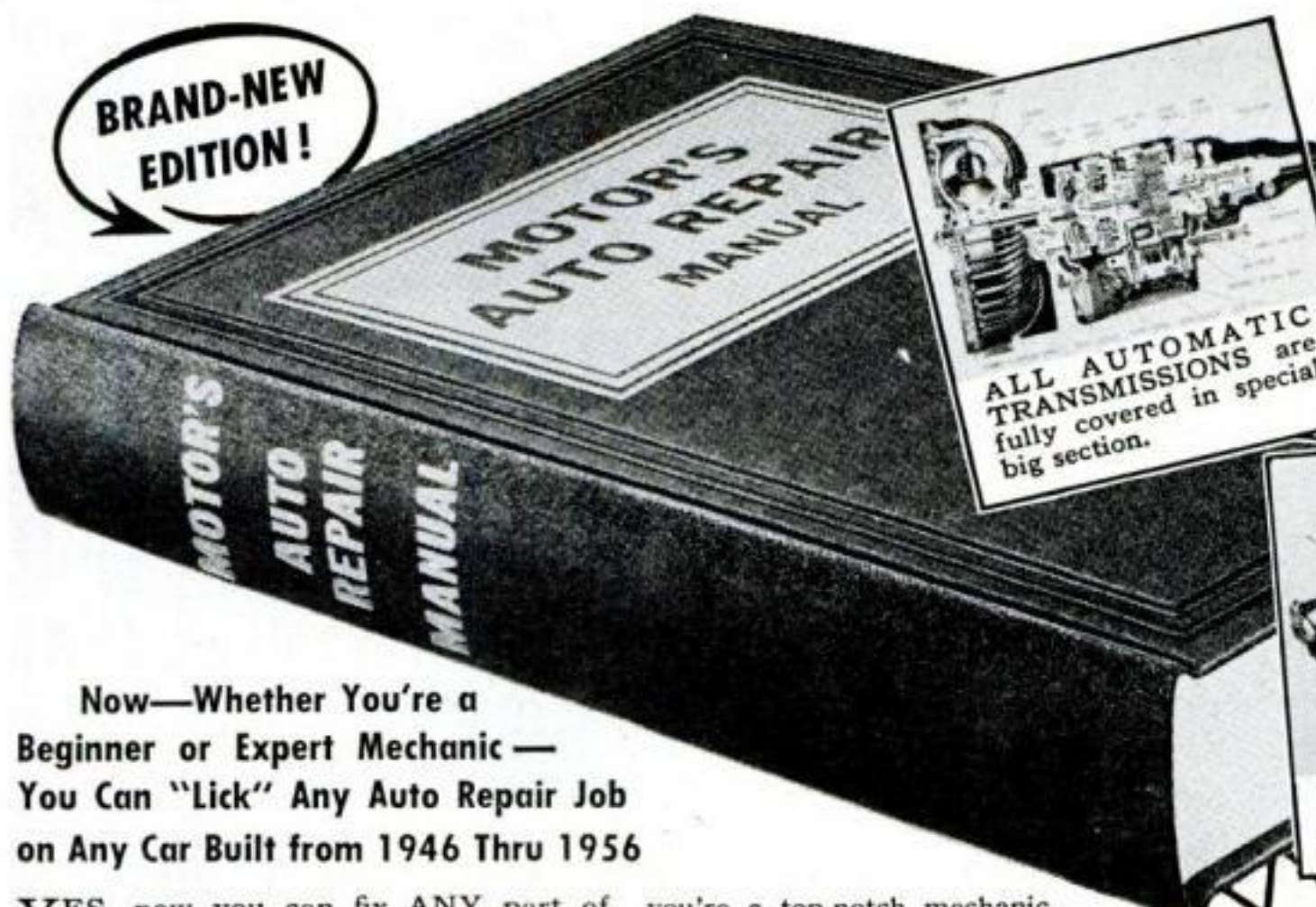
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—V. Lauria, Nev.

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who require push-button driving and on whom ammeters would be wasted—the intermittent lights at least provide a diversion for the average driver who doesn't look at the road anyhow. What we need is *more* of these pretty little blinkers. I suggest:

1. A flashing light to blink when the gasoline supply is down to one pint;
2. A telltale to flash when it is time for an oil change and grease job;
3. A warning light to indicate when the monthly payment is due.

M. H. BILYK, Teaneck, N.J.

## By Then, It's Too Late

I am against telltales because they give no warning until danger is imminent. All at once it's there.

What if a light were used in place of a fuel gauge? The light would go on when gasoline was required. This, of course, would be ridiculous: The warning might come when you were 20 miles from a gas station. Under similar circumstances, loss of oil pressure or failure of the generator



could result in equal inconvenience, plus serious damage and added expense.

It is true that most people pay little attention to gauges, probably because in most cases they are made to look like mere decorations. The public should be made aware of the advantages of gauges. They may tell you *in time* what a telltale will tell you too late.

RICHARD J. PARK, Waldwick, N.J.

## You Can't Ignore 'Em

Before your car broke down that time, did you see that stubby little hand on the oil-pressure gauge slowly sink to zero, or, perhaps, fluctuate quickly from normal to very low and back to normal? Not if you weren't looking directly at the gauge. Yet even the busiest driver would have noticed a red light. The light is designed to give adequate warning of impending trouble.

It's true that the generator light doesn't



# INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

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show the charge of the battery, but, then, neither do most modern ammeters. At least the light warns that the battery is not being charged long before trouble develops from that source.

A light can be placed for best side vision without disturbing the stylist. It eliminates resorting to a little gauge that is often out of sight when the driver is looking at the road. It's so easy to fail to see a stubby little hand that has moved through 15 or 20 degrees of its arc. But a red light is an insistent thing. You cannot ignore it.

So we average people will take the car to a mechanic—and let him clamp on his gauges *with dials that can be read.*

MRS. MARJORIE R. WHITE, Sharon, Mass.

## Upside-Down Hydro

That hydro hot rod in your March issue [p. 112] caught my fancy. But I'm wondering if you didn't make a mistake in the drawing, where you show the bow of the girder as being 5" above the stern. Also, is there any possibility that a 5-hp. motor could be used with a light person aboard?

STEVE MARSHALL, Toledo, Ohio

*There's no mistake in the drawing. The girder is shown upside-down, in the position in which it fits in the building jig shown above it. A 5-hp. motor will plane the little hull, if the driver isn't too heavy.*

PSM editors built a hull to the author's plans before publication, and tried it out



*with various motors on a measured course in Florida. Some findings: With 140-lb. driver plus 30-lb. auxiliary fuel tank, a 5-hp. motor planed the boat readily. Maximum speeds were about 21 m.p.h., about half the speeds obtained with a Class A racing motor. Best transom height with the small motor was 16", with the racing motor, 14 1/4".*

## Muscular Dystrophy, Not MS

As a survey worker for the Rhode Island Chapter of the National Multiple Sclerosis



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If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

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**142 - V VICTOR BUILDING, WASHINGTON 1, D. C.**



Society, I was most interested in your reference to MS [Mar., p. 96].

However, the error which most frequently occurs in the public's understanding of this incurable disease has been accentuated further by your use of the phrase "the fatal muscular dystrophy."

Has this work at the Jackson Laboratory been done for muscular dystrophy or for multiple sclerosis (MS)?

ESTELLE SLADER, Providence, R.I.

*The strain of mice discovered at Jackson Laboratory have a disability similar to muscular dystrophy, not to the nervous-system disease, multiple sclerosis. Our error.*

### How They Ran in '55

In your January, 1955, issue was an article called "How they ran in '54." It told how all the makes of cars sold in 1954. Will this information be published on the 1955 cars?

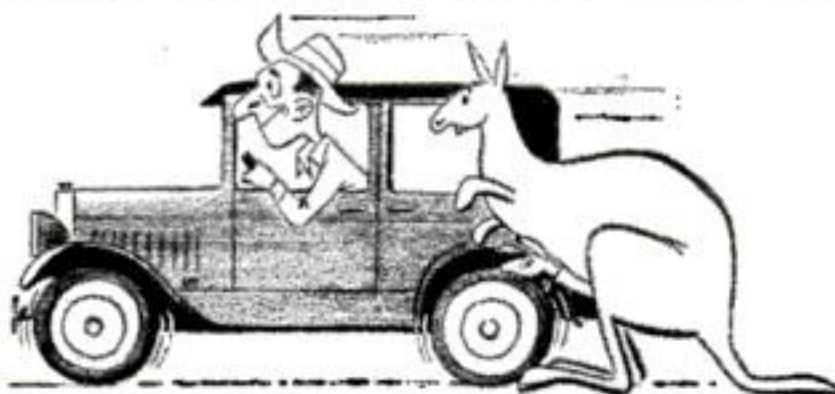
GEORGE NEIMAN, York, Pa.

*Here are new-car registrations as reported by the authoritative trade journal, Automotive News:*

|                  |           |                  |         |
|------------------|-----------|------------------|---------|
| Chevrolet .....  | 1,640,681 | Cadillac .....   | 141,038 |
| Ford .....       | 1,573,276 | DeSoto .....     | 118,062 |
| Buick .....      | 737,879   | Studebaker ..... | 95,761  |
| Plymouth .....   | 647,352   | Nash .....       | 93,541  |
| Oldsmobile ..... | 589,515   | Packard .....    | 52,103  |
| Pontiac .....    | 530,007   | Hudson .....     | 43,212  |
| Mercury .....    | 371,837   | Lincoln .....    | 35,017  |
| Dodge .....      | 284,323   | Willys .....     | 6,267   |
| Chrysler .....   | 156,458   | Kaiser .....     | 959     |
| Continental..... | 606       |                  |         |

### Aussies Like Old Chevies

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K. R. HERRON,  
Punchbowl, New South Wales

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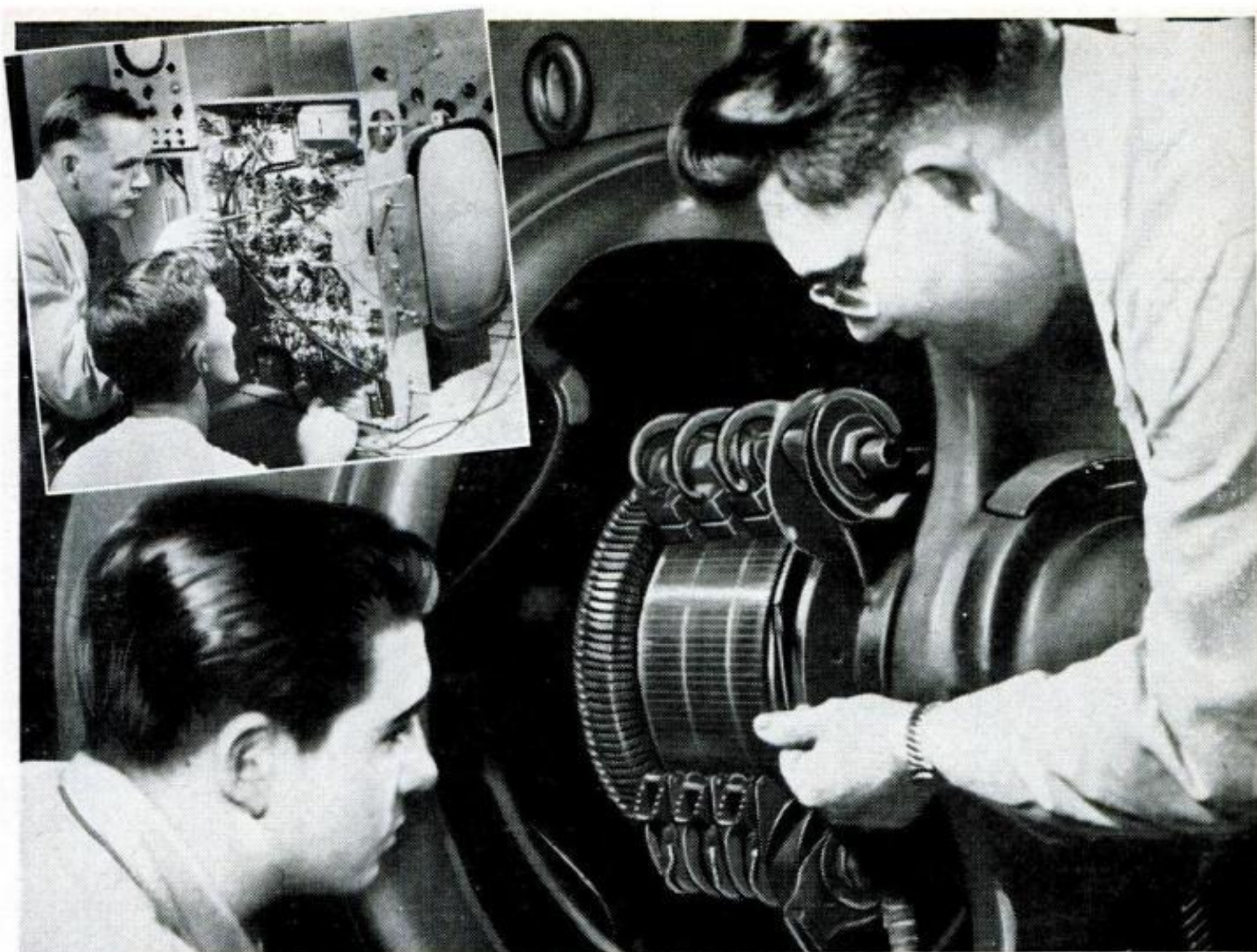
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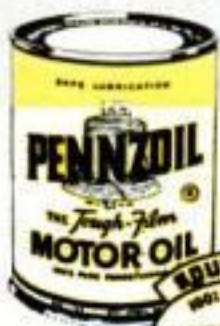
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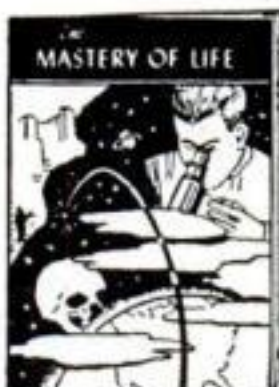
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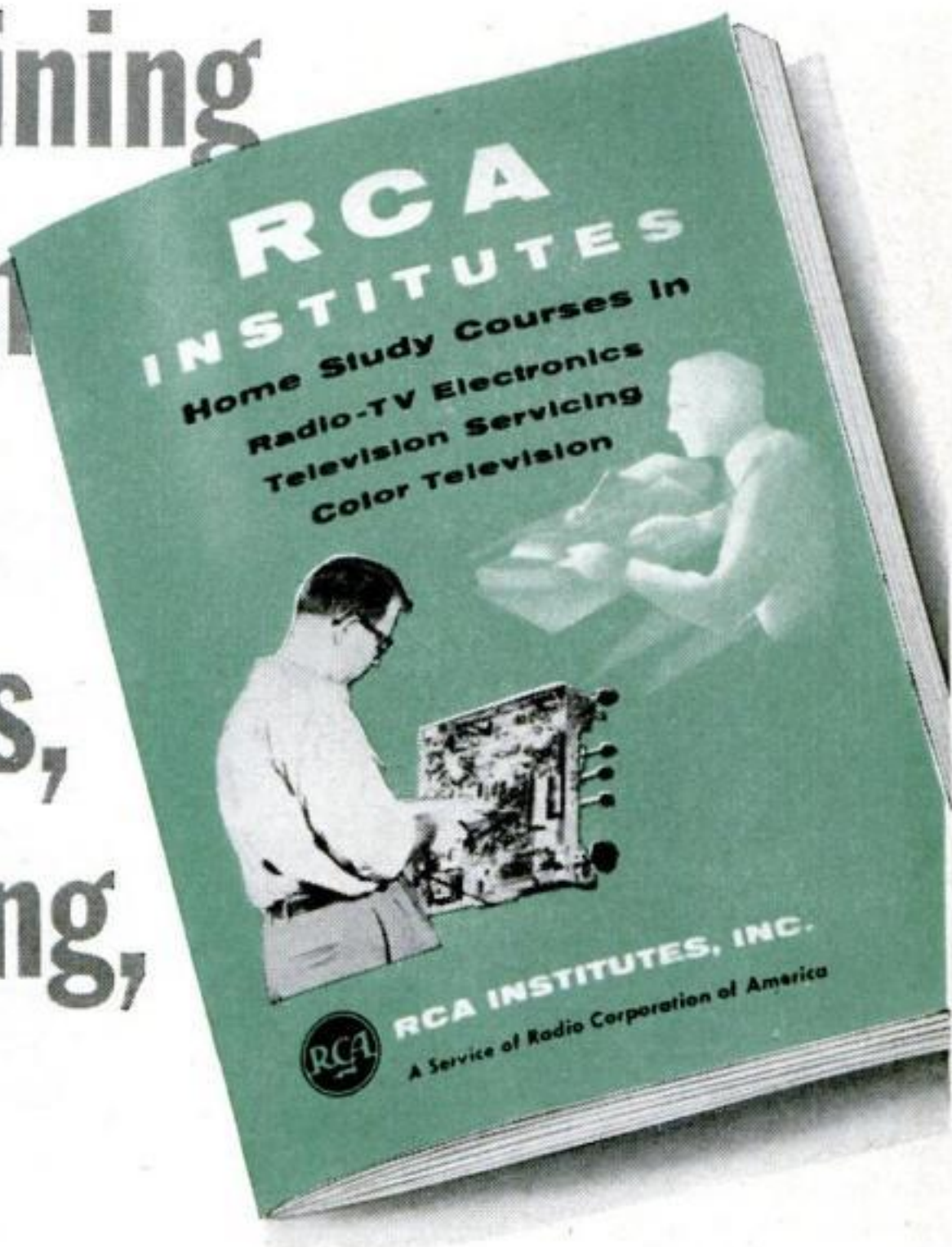
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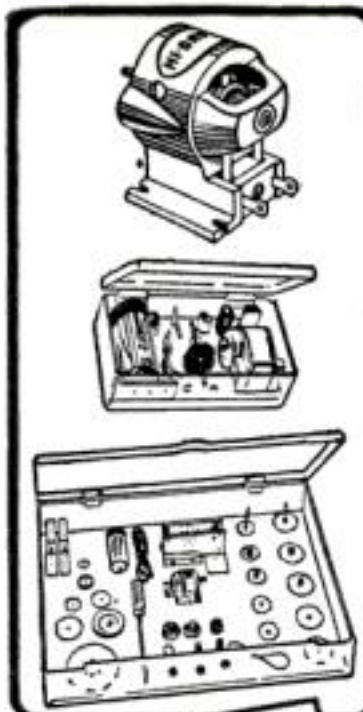


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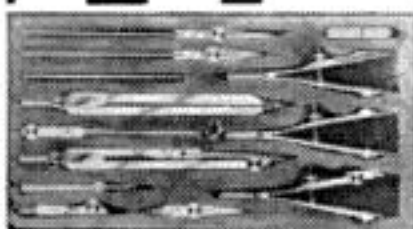


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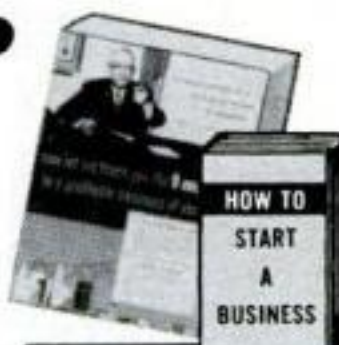
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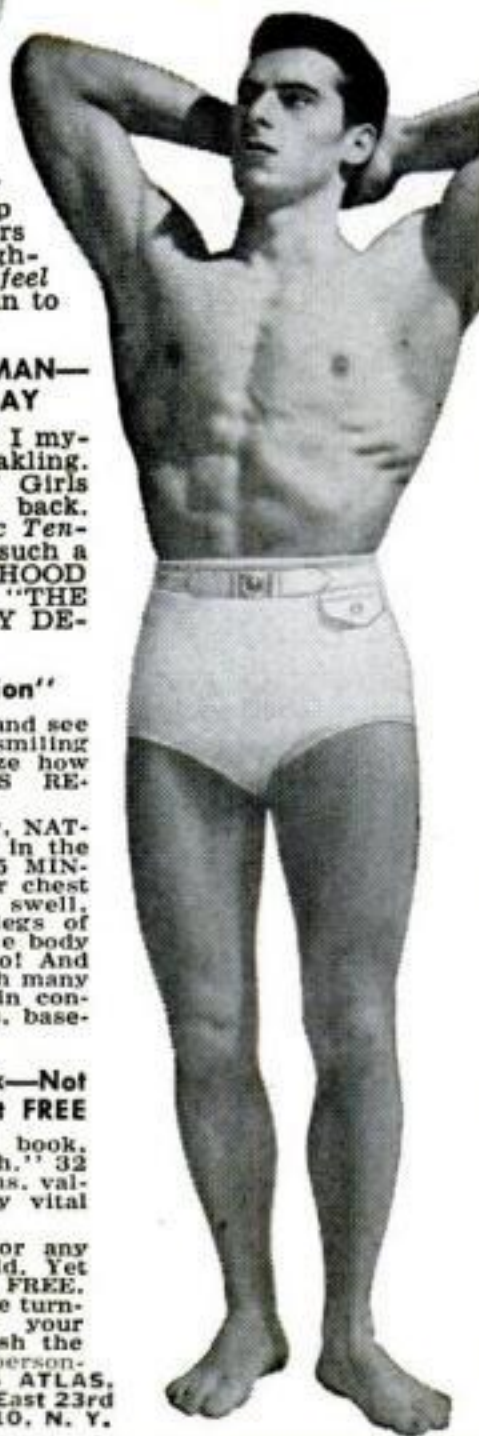
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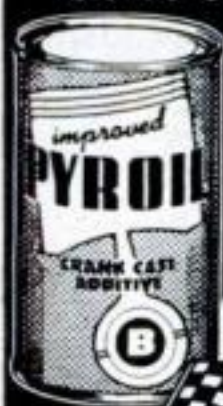
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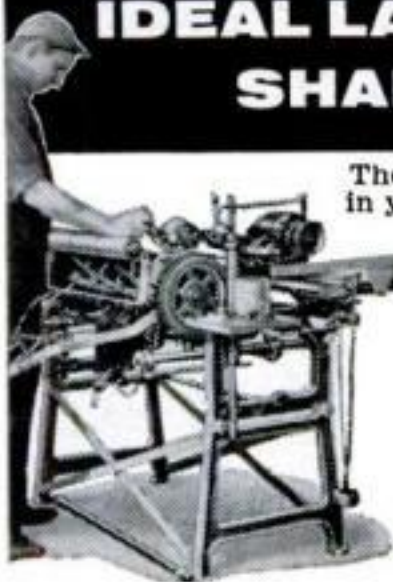
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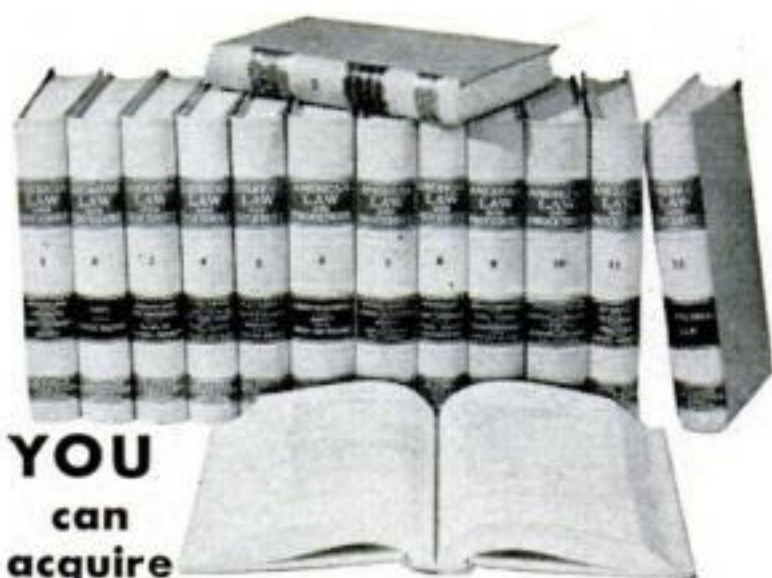
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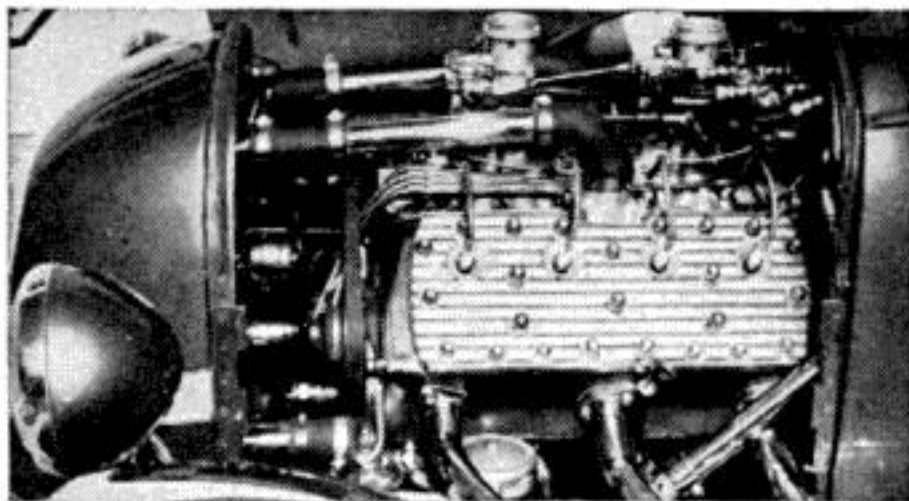
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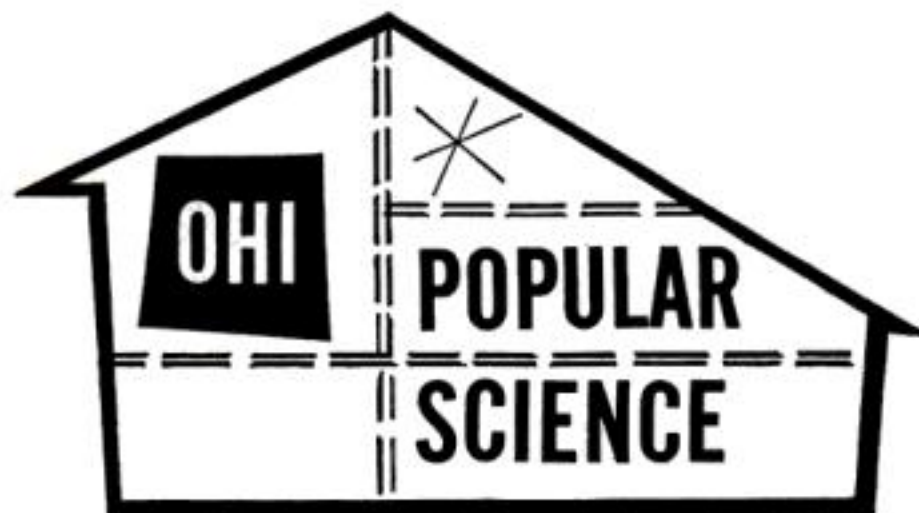
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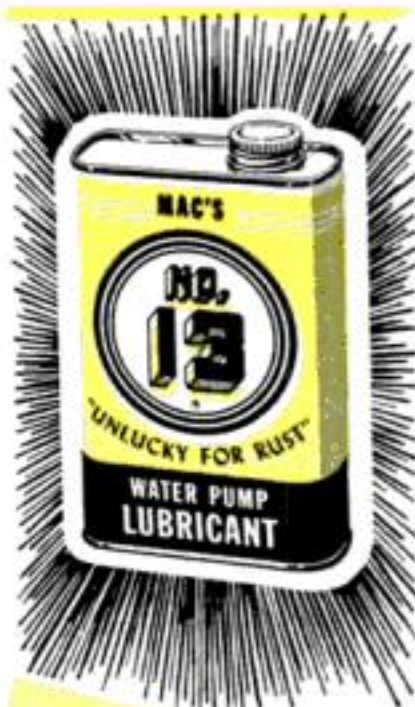
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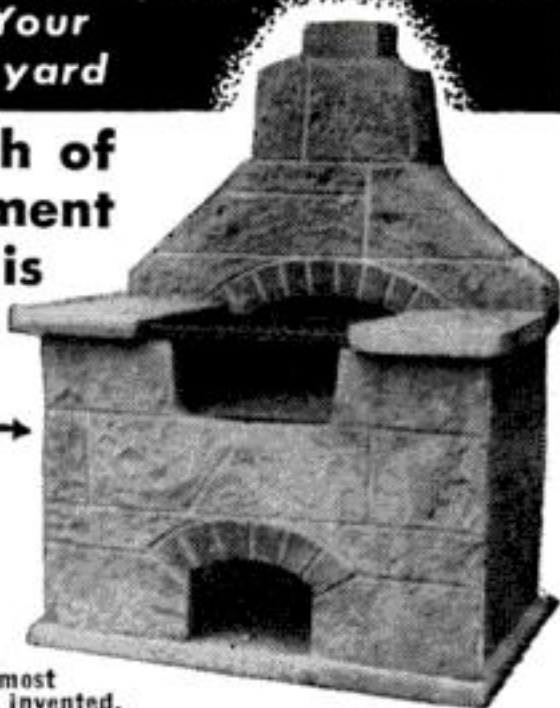
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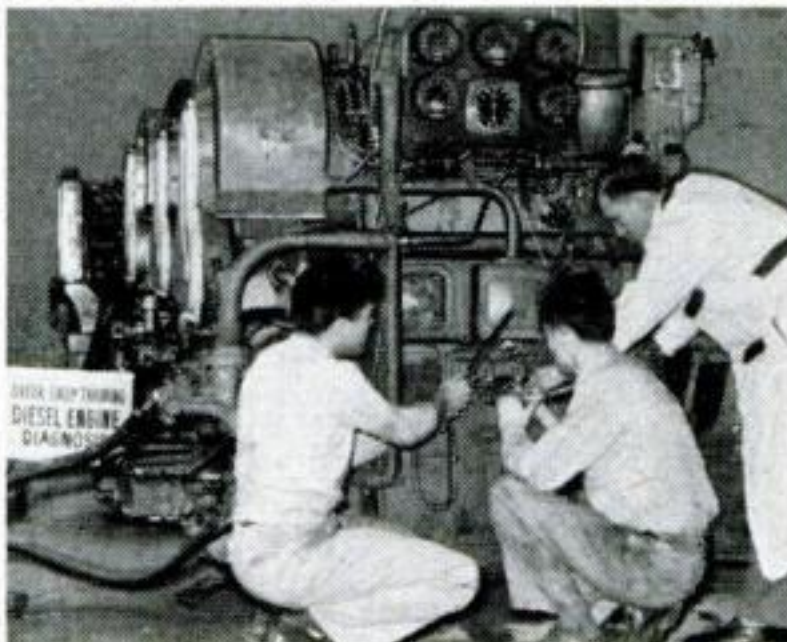


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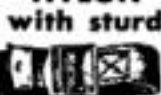
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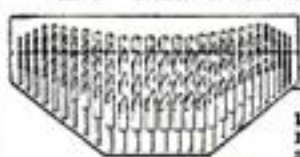
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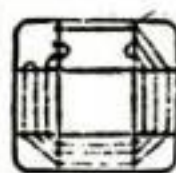
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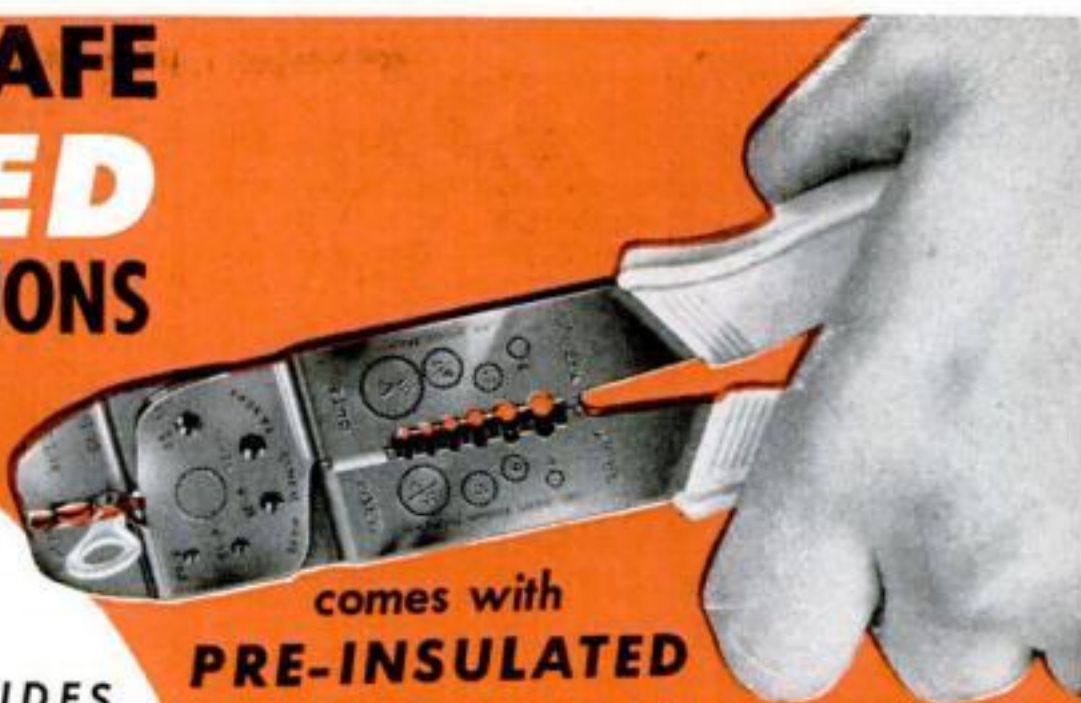
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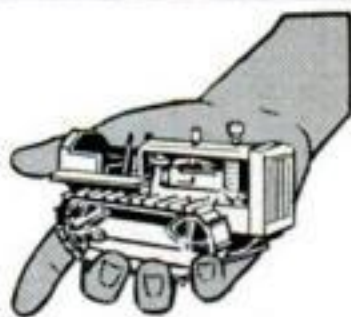
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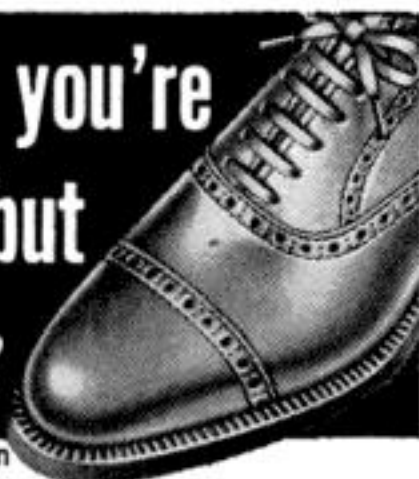
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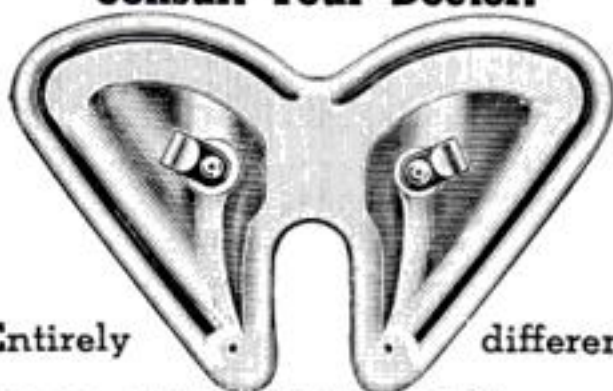




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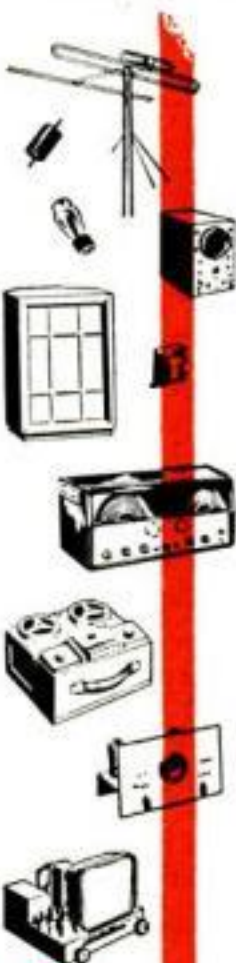
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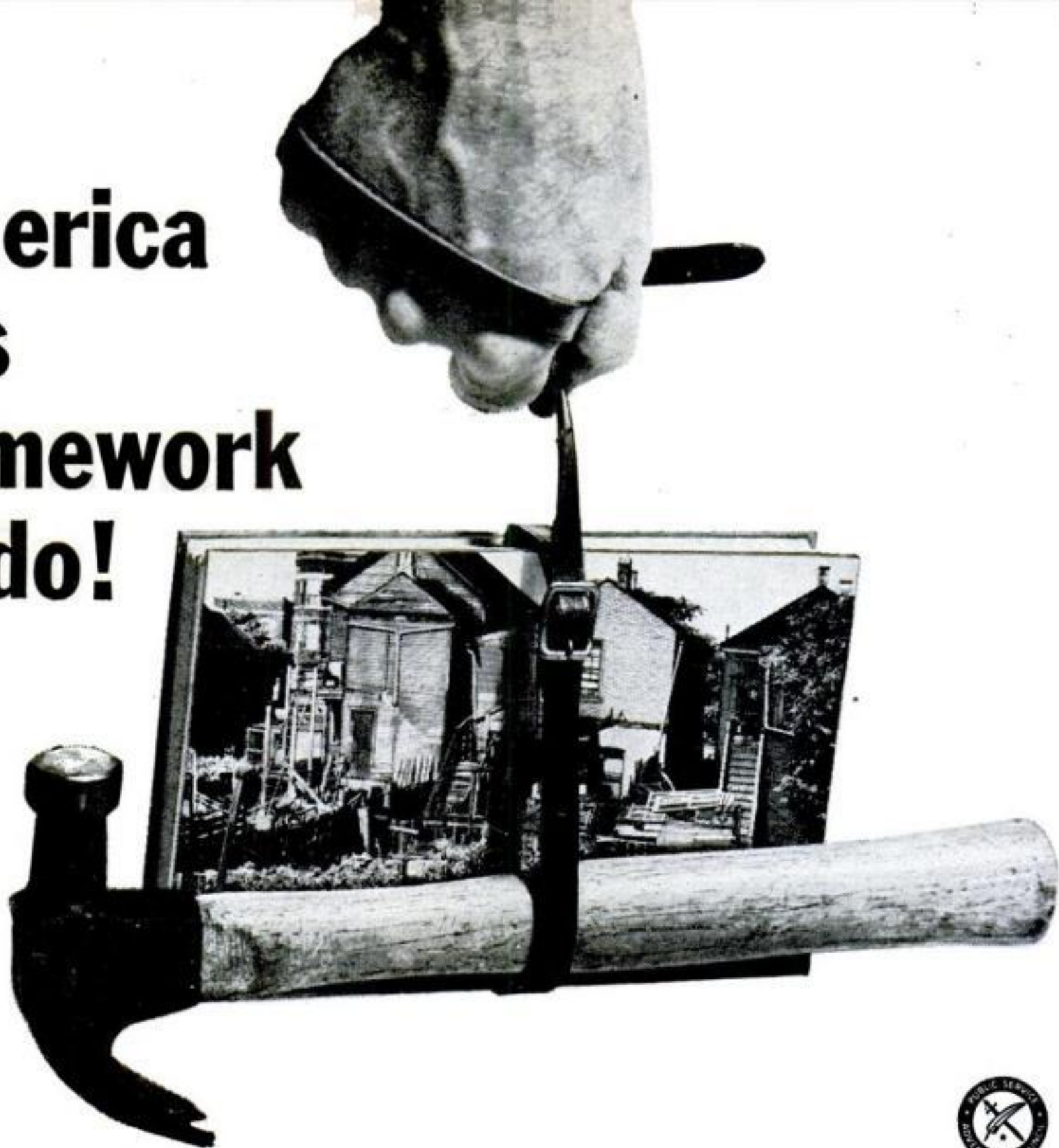
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If your town is like most in the U. S., here's what the figures show: 1 out of every 10 homes are rock-bottom slums. Nearly one-half urgently need basic repairs.

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## Slums are YOUR homework

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Some slums are beyond repair. They must be torn

down and a fresh start made. Others can be made to conform to accepted living standards. So it is up to you to get behind every sound program which seeks to provide adequate housing for all our people.

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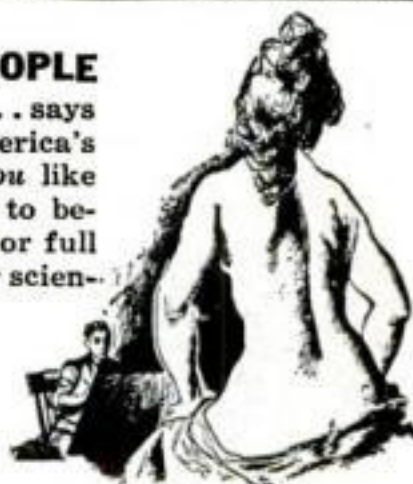
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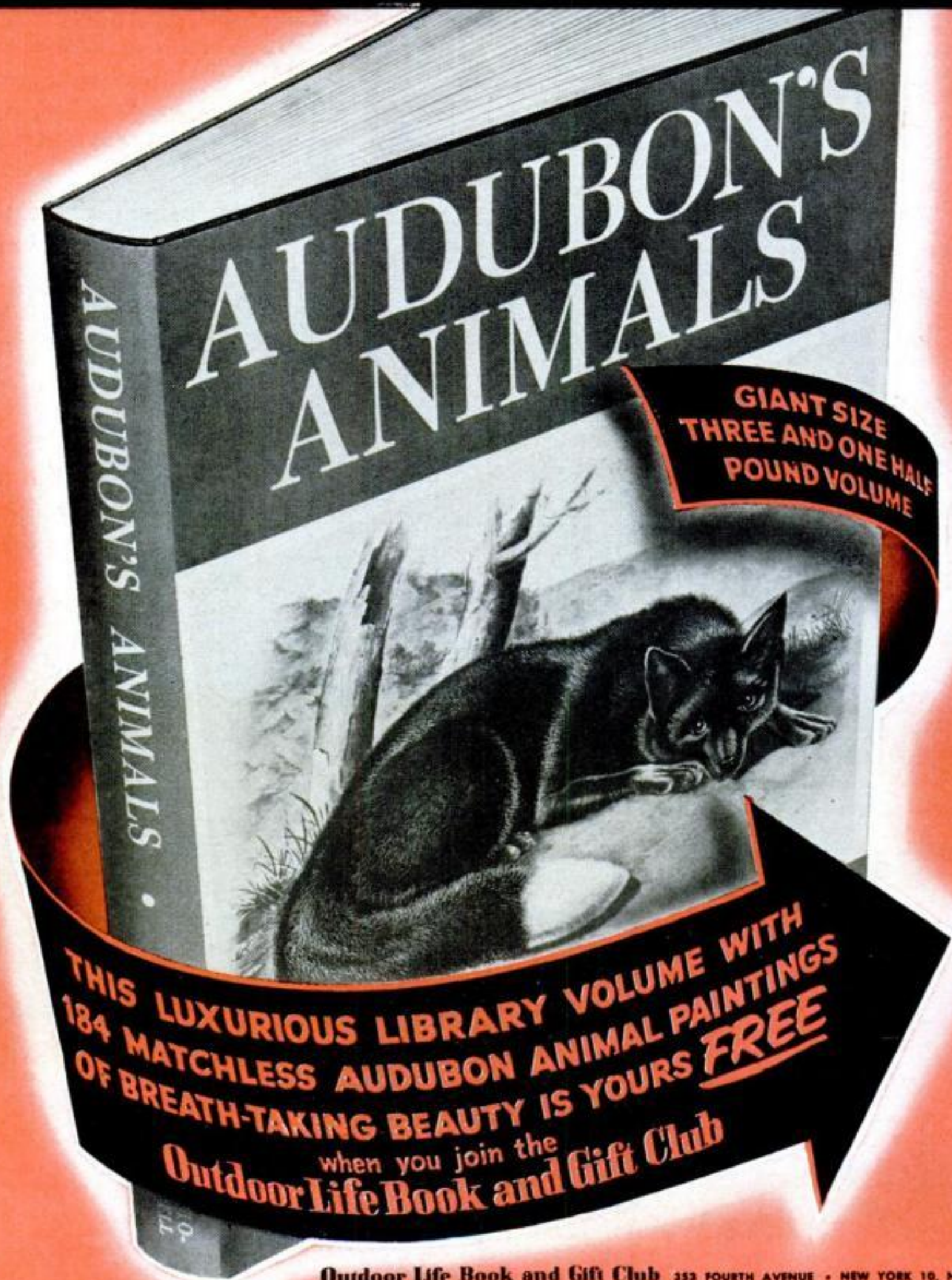
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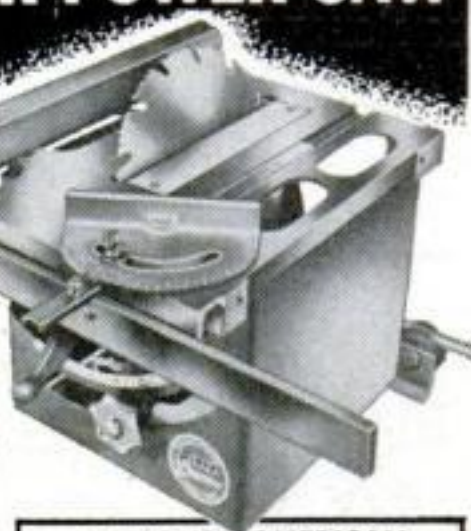
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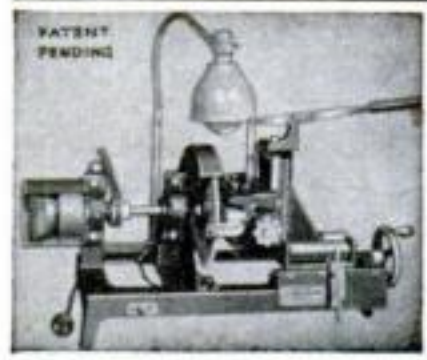
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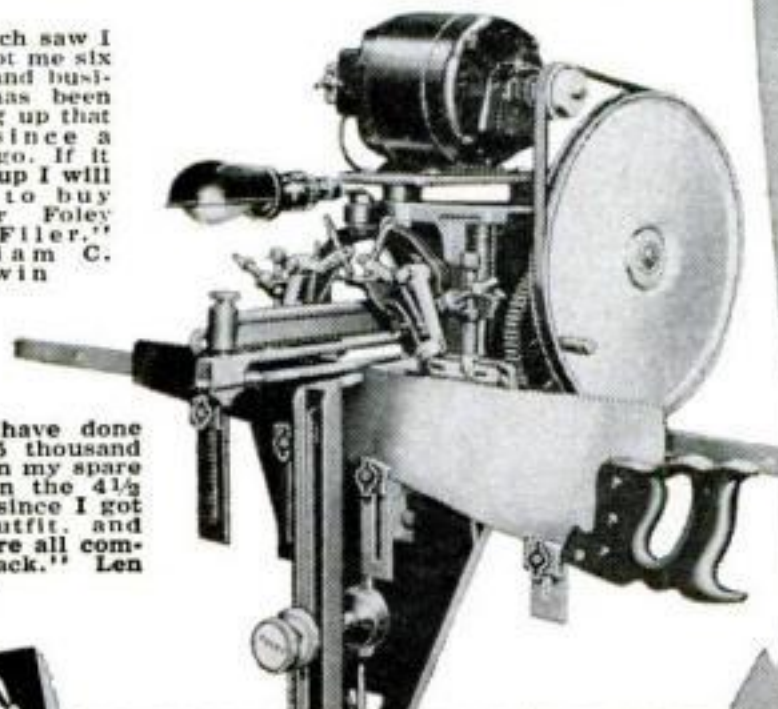
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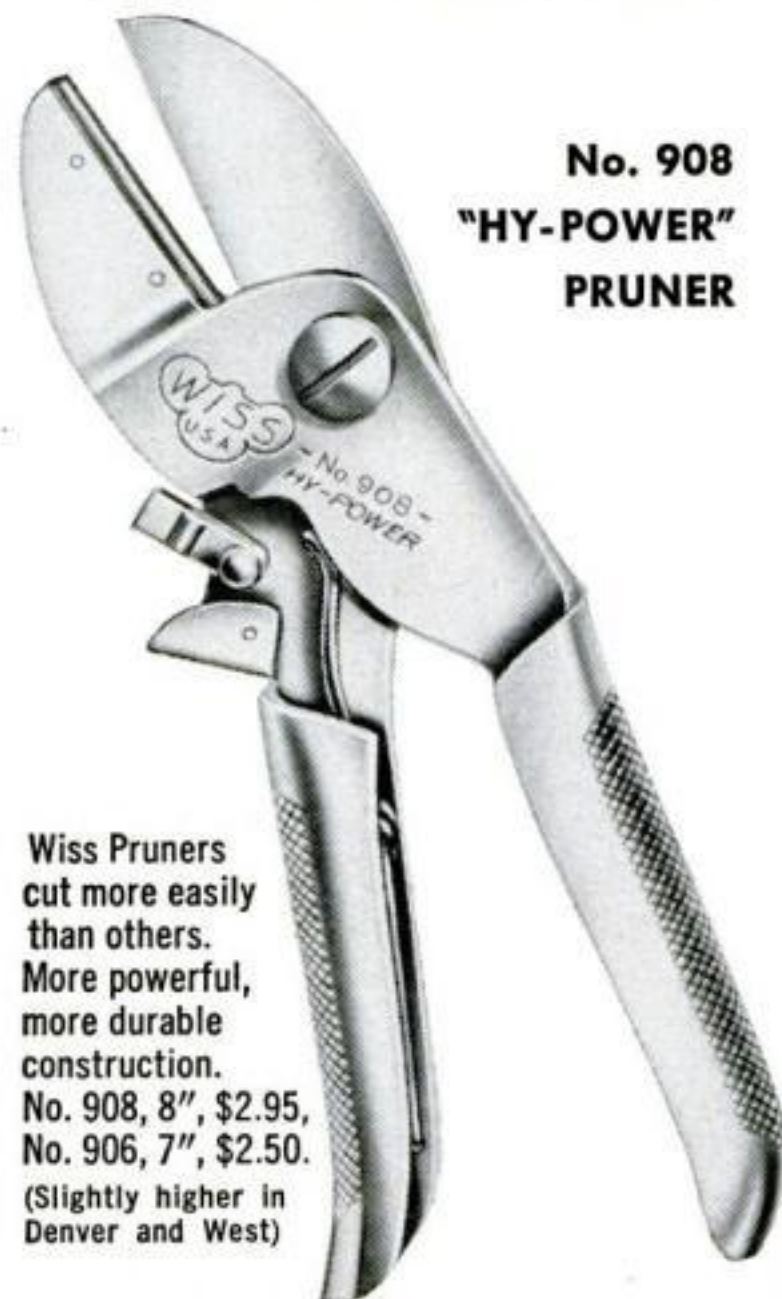
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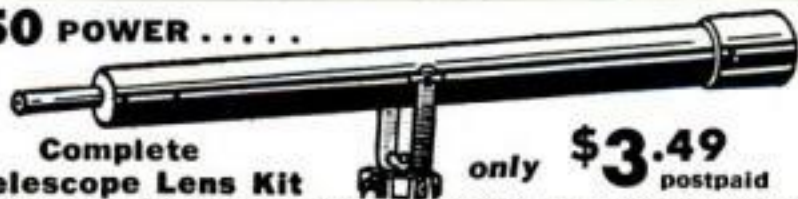
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## This gang is dead against the **MARLIN 39-A** LEVER ACTION .22!

The fast-handling, fast-firing 39-A has always been famous for playing rough with varmints. Now it has Micro-Groove\* accuracy, too—so you can pick off these cagy pests with more certainty than ever!

See this pest-poison combination of lever action and Micro-Groove at your dealer's. Feel its fine balance, perfect snug-down into shooting position. You'll know you can go and get 'em, with a 39-A!

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\*Patent applied for.

\$65.95\*\*

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FINE GUNS SINCE 1870

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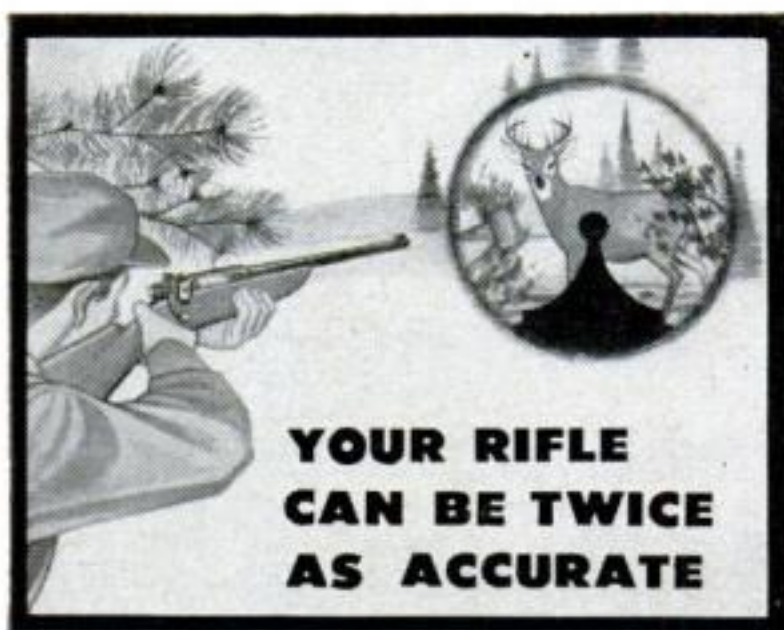
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it's so easy  
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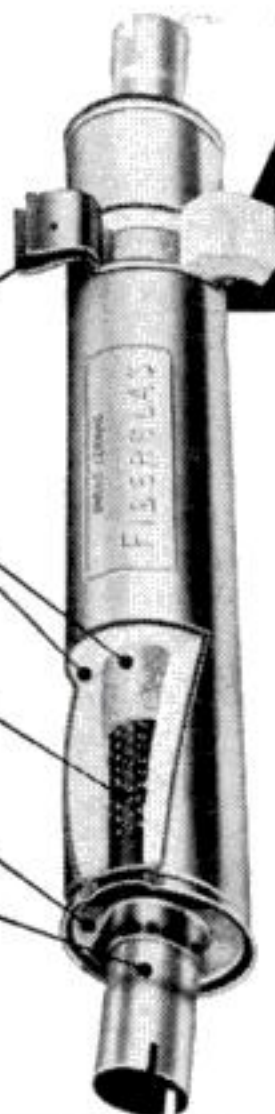
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The big 2" straight-through tube in the Dyna-Glas muffler practically eliminates back pressure, thus giving you greater acceleration and power and increased engine efficiency with resulting gas savings. In addition to greater performance, Dyna-Glas gives you deeper, quieter, mellow golden tones—and, with its exclusive heavy double-wrapped outer shell, longer life. Try Dyna-Glas duals and headers. They eliminate the harsh noises common with ordinary duals on V8's—give you the utmost in power.

The makers of Dyna-Glas also make a fine steel-packed muffler. Ask to see **Dyna-Pak**.

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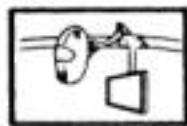
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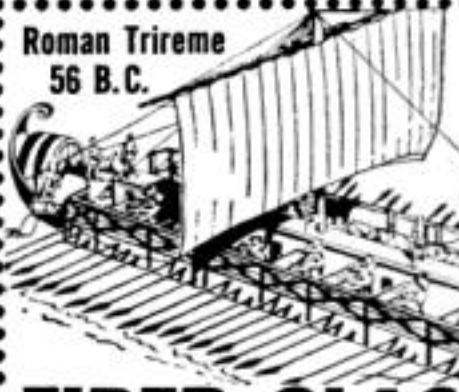


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**Easy..**  
**TO FILL ANY**  
**SPINNING**  
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**Quickly...**  
**without twist!**

Anyone can do it,  
without help! Simply  
fasten line to reel spool,  
step on Spin-Pak,  
and wind the line on  
your reel. No twist!



## Shakespeare WEXFORD SPIN-PAK

### NEW... EXTRA LIMP TYNEX MONOFILAMENT

Dependable, uniform spinning monofilament for ANY spinning reel. Sensationally soft and manageable, No. 5400 is "limp as an old shoelace". Especially processed by Shake-

spare line specialists from Du-Pont Tynex Nylon... for finest Shakespeare spinning reels when filled with line at factory.

**LOOK FOR THIS DISPENSER AT BETTER TACKLE DEALERS**  
Packaged on plastic wheels; two wheels connected in plastic box. With Spin-Pak you save time and temper. Easy as loading a bait-casting reel! \$1.00 for 100 yds. of 6-lb!



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Please send, FREE, new 1956 "TIPS and TACKLE" booklets and Joe Godfrey pocket fishing calendar.

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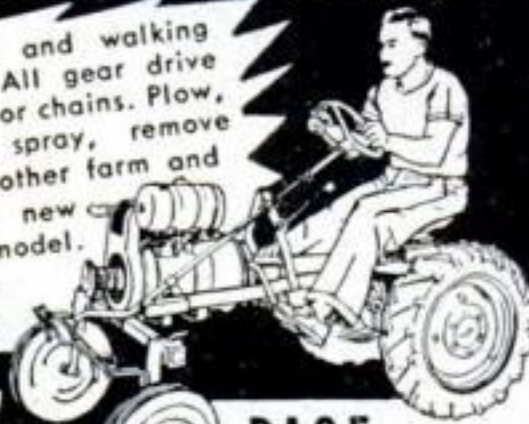
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1956 line now ready - low prices!

Ruggedly built riding and walking models, 2 to 6 HP. All gear drive with reverse, no belts or chains. Plow, till, harrow, disc, spray, remove snow, do dozens of other farm and home chores. Also new "Bantam" one-wheel model. Fully Guaranteed LOW PRICES. EASY TERMS



Free Catalog  
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PLANES  
BOATS  
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"CUSTOM  
MIDGET"  
RADIO

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**\$9.98**

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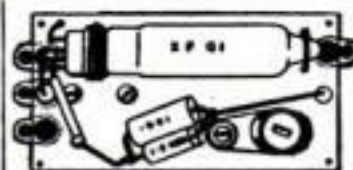
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**\$9.95** Per Pair  
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For cars and trucks. Front and rear. Gives 2000 lbs. extra capacity for all 1/2, 3/4, and 1 ton trucks; 500 or 1000 lbs. extra for all cars. Easily installed. Guaranteed. State make, model. Dealers wanted.

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### SUPER SLINGSHOT

SILENT • RIFLE FAST • POWERFUL • ACCURATE

Great for small game and target shooting! 45 pound pull. Big, sturdy stock. Lively raw rubber. Sweet shooting. Free! 50 Sock-O "cannon balls", extra rubber and target. Sent by return mail. Guaranteed. Every sling fully tested. No COD's please.

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### WRITE FOR OUTBOARDERS' BIBLE—

our 1956 catalog. It's FREE. Contains much valuable information on how to get MORE SPEED, or more thrust for WATER SKIING from motors of 7 1/2 to 50 HP; better performance and load carrying capacity from any motor old or new. Easily understood recommendations enable you to choose a propeller virtually custom-built for your motor-boat-load combination — much more rugged and damage resistant than the original. Write NOW. Michigan Wheel Co., Dept. PS-5 Grand Rapids 3, Mich.



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100% PROTECTION  
This Tear-Gas Pencil discharges smothering clouds of tear gas to instantly stop, stun and incapacitate the most vicious man or beast, an effective substitute for dangerous firearms; leaves no permanent injury. No selling experience needed. Handle as a profitable sideline . . . SELLS EASY TO SERVICE STATIONS SMALL STORES LOAN OFFICES BANKS, HOMES soon you'll sell it full time. Start low! Send \$4.95 for complete demonstrating kit of Automatic Tear Gas Pencil, 10 demonstrators & 3 Powerful Tear Gas Cartridges. Not sold to minors.

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at amazing savings.  
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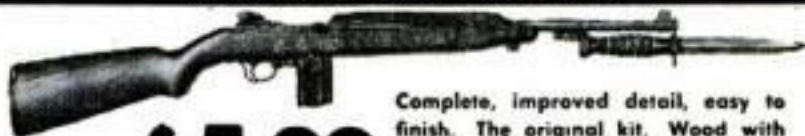
70 Miles Per Gal. Gas  
UP TO 30 MILES PER HR.

1/5 the cost of most other cars.  
Ideal for golfers, industrial plants, farms, etc. Also Child's 2 pass. cars. Free literature Write:



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**\$5.00**

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Complete, improved detail, easy to finish. The original kit. Wood with process for gun metal finish. ORDER THESE MODELS DIRECT Ideal for den or game room

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- Automatic free-wheeling 2 w. d.
- Automatic 4 w. d. forward & reverse
- Locking control for "solid" 4 w. d.

## GET MAXIMUM USE OF 4-WHEEL DRIVES!

### MAKE 2 VEHICLES OUT OF 1!

Your 4 w. d. is a 4 w. d. work horse or 2 w. d. "pick-up" as you need it—as you shift! No drag, gear whine, shimmy in 2 w. d.; big savings in gas, tires, repairs. For all 4 w. ds. to 1½ tons at dealers or write:

## WARN HUBS

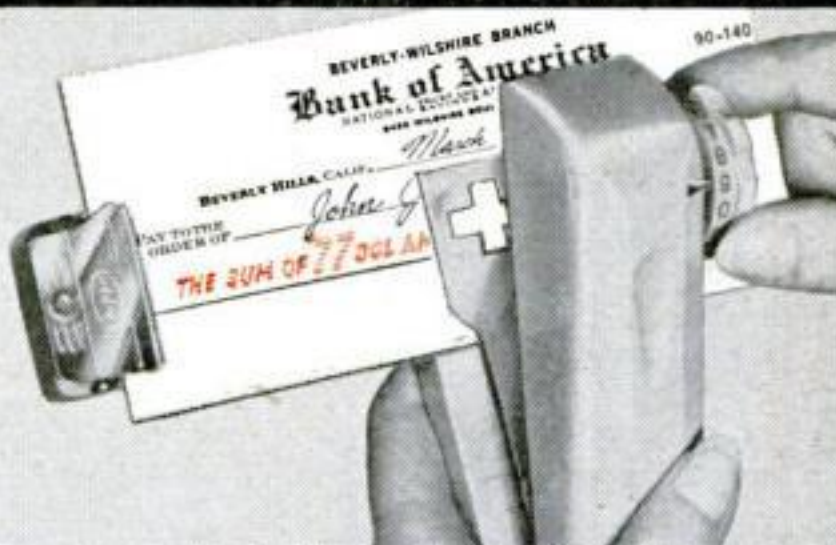
WARN MANUFACTURING CO.  
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## If you write checks... **YOU CAN BE ROBBED!**

Americans are being robbed of over \$600,000,000 every year by check forgers, and most of us don't even realize we're being taken! Why? Because the check forger, or "raiser," is not always a professional crook. Your check can be altered by any of the 5 to 8 people who will handle it before it clears the bank. Most of us don't examine our statements too closely, and the methods forgers use to swindle us are ridiculously simple. Here's how forgers "raise" checks to bigger amounts with just an easy stroke of the pen:

*Seventy* 7 to 70 *70%*  
*Four hundred* 100 to 400 *400%*

Unless the "mark-up" causes an overdraft, the forger seldom gets caught—and the bank accepts responsibility only in the rare cases where the forgery is obvious. Statistics show that over 90% of the huge losses through forgery come out of the pockets of small depositors, the people who can least afford it!



**NEW INVENTION PROTECTS YOU.** Until recently, big office check-writing machines costing up to \$500 were the only guarantee against forgery loss. Now an easy-to-use, low-cost check-writer, the Magna CHECKMASTER, makes positive check protection possible for millions of families, professional people, and small businesses throughout the country—and at a price anyone can afford.

This ingenious new check-writer automatically spaces and perforates each number and word into the paper with indelible red ink, making any check impossible to alter. Anyone can write checks with a Magna CHECKMASTER in just 10 to 15 seconds per check. Takes any size check, and it's built to last a lifetime and give exactly the same positive protection as machines costing many times as much.

**MONEY BACK UNLESS YOU'RE SATISFIED.** Send only \$14.95 for your Magna CHECKMASTER today. If you are not completely satisfied for any reason, return it within 10 days for full refund.

**MAGNA INDUSTRIES, INC., DEPT. PS-5**  
1060 Crenshaw Blvd., Los Angeles 19, California

**Magna Industries, Inc., Dept. PS-5**  
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Please rush \_\_\_\_\_ Magna CHECKMASTERS @ \$14.95 each.

- ☐ Enclosed is \$\_\_\_\_\_ in full payment for this order; please ship postpaid.
- ☐ Enclosed is \$5.00 deposit for each CHECKMASTER. I'll pay the postman the balance, plus COD charges.

Name \_\_\_\_\_

Address \_\_\_\_\_

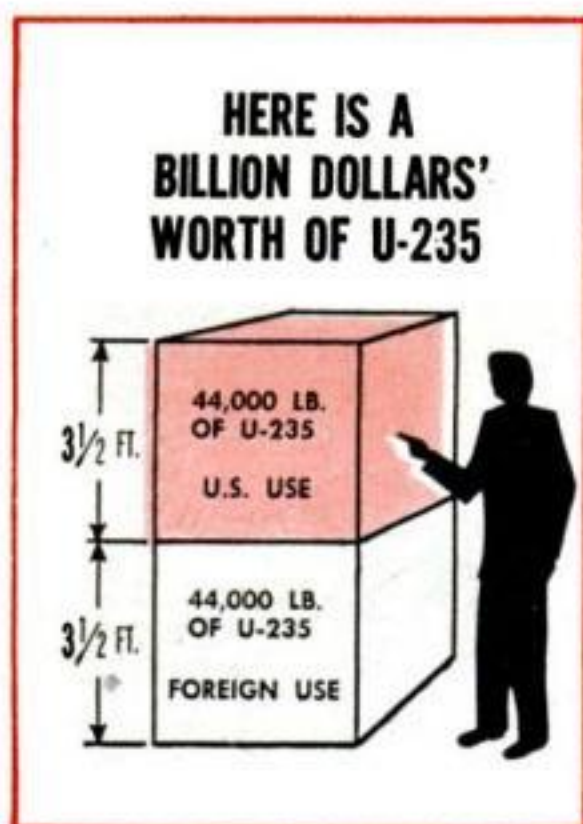
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**DEALERS AND DISTRIBUTORS**—A dealer and distributor network is now being formed to handle the huge demand for the Magna CHECKMASTER. Write or wire for complete details on how you can qualify for a lucrative franchise.



**You received the biggest dose of cosmic rays** ever recorded, the night of Feb. 22. The sudden jump in intensity was noted in laboratories all over the world (the intensity doubled in London). The cause was a tremendous eruption on the sun, equivalent to a million H-bombs. Cosmic rays are similar to rays from atomic explosions but are believed harmless.

**Phenomenal success of the great uranium hunt** is one of the reasons behind the President's plan to sell \$1,000,-



000,000 worth of atomic fuel for peaceful uses. Rich ore finds during the past three years have provided more than 25 uranium deposits greater than 100,000 tons each. Three of these—in New Mexico and Utah—hold millions of tons apiece. The small amount being released (see sketch) could be extracted from about 6,200 tons of natural uranium. It couldn't be packed into blocks like those shown, of course, for it would start to chain-react.

**The cause of cancer** is a basic change in the way that body cells produce the energy for life, according to an impressively documented theory outlined by Dr. Otto Warburg, Nobel Prize-winning physiologist. He says: Ordinary cells use respiration (consuming oxygen) to manufacture ATP, the compound through which energy is made available for life. If this respiration process is injured, some cells begin to manufacture the essential ATP by another process, fermentation (consuming lactic acid). Fermentation is less efficient, however, and cannot maintain the specialized forms of body cells. So the cells that depend on fermentation degenerate into crude, wild cells: cancer. Any number of things—atomic rays, chemicals, pressure—may cause the cells to change from respiration to fermentation, but it is this change that actually produces cancer.

**The Mexican Road Race**, off-again on-again because of the hazard to spectators, is reliably reported to be on-again. The date may be late winter to permit entry of '57 cars.

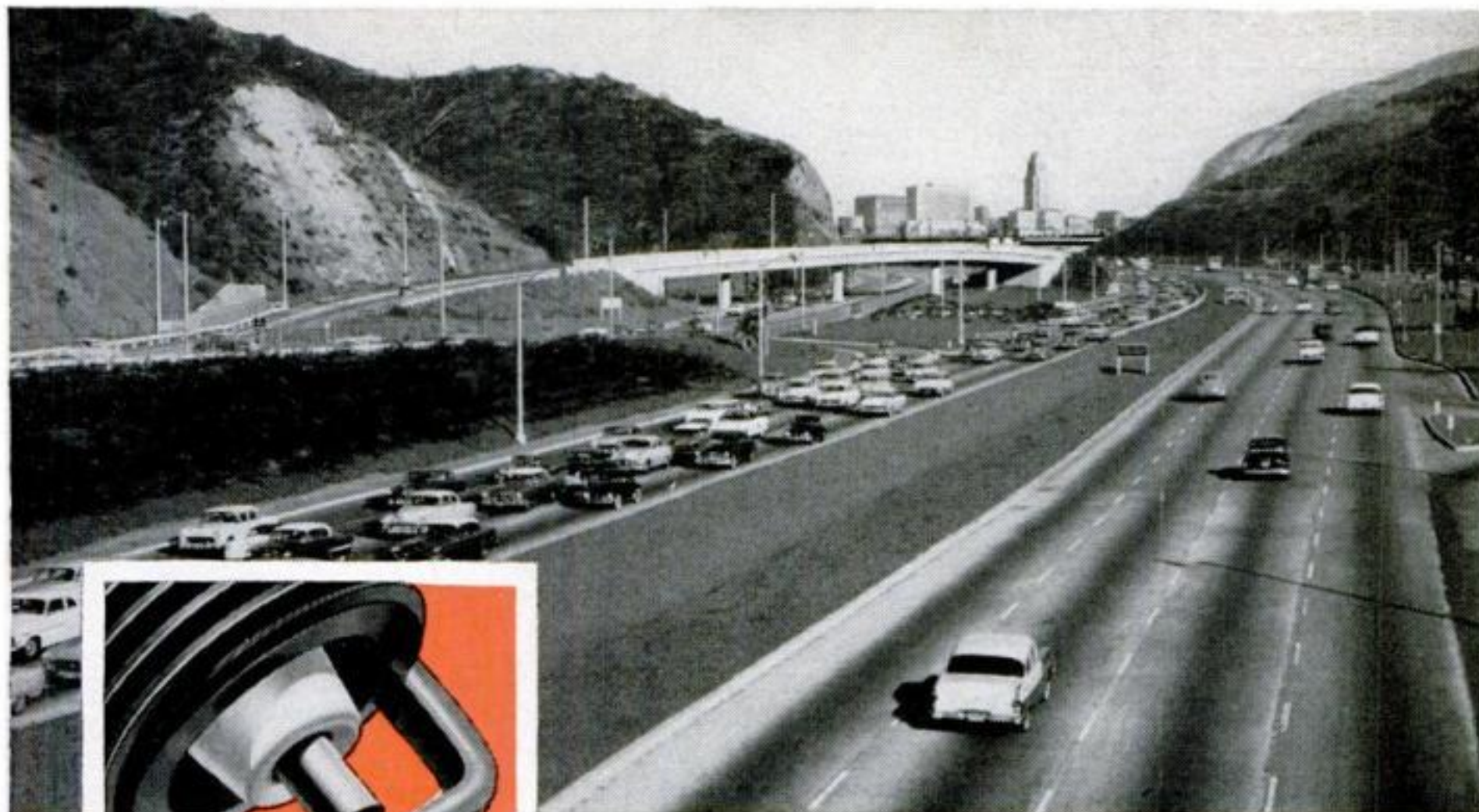
**Woodpeckers foiled?** Utility poles made of plastic, like fishing rods, are being tried by the Consumers Power Co. in Michigan. The company hopes that they will prove too tough for the pileated woodpecker, which wrecks many thousands of dollars' worth of wooden poles a year.

**Einstein's last revisions** of his new Theory of Relativity have been published. They are 33½ pages of equations that outline laws covering both gravity and electromagnetism. This theory has not been proved or disproved—and may never be.

**New Packard series**, intermediate in price between Clipper and existing Packard, will be on the market this spring. Engineering and styling lines will closely resemble other Packard cars.

**Good book.** PSM contributor R. J. De Cristoforo has written an excellent manual for workshoppers, *Power Tool Woodworking for Everyone* (Magna Publications, Menlo Park, Calif., \$4.95). It is clear and simple enough for beginners without neglecting advanced techniques. Pictures—they are unusually good—show one type of multipurpose tool, but the text applies to all modern machines in use.





Some spark plugs are designed for low speeds  
Some spark plugs are designed for high speeds, but ...

## Only new **POWER TIP** "fires up" your engine at all speeds!

**Auto-Lite Resistor Spark Plug with Power Tip is the first and only spark plug ignition-engineered for today's engines and today's driving.**

Up until now you just couldn't get a spark plug that would continue to operate at top efficiency at all speeds! Either you got "hot" plugs that were satisfactory for city driving only . . . or "cold" plugs that were fine at higher speeds but easily fouled at lower speeds, causing engine misfire, wasting fuel and power.

Now at last there's a spark plug that's hot enough at low speeds to resist fouling and cold enough at highway speeds to check destructive pre-ignition. It's the revolutionary new Auto-Lite

Resistor Spark Plug with Power Tip! It's the only spark plug that "fires up" your engine for peak performance and economy at all speeds.

**The protruding Power Tip makes the difference.** It gets hotter than the conventional plug at low speeds because the Power Tip extends into the combustion chamber. It resists fouling because fuel deposits burn away clean. Yet at high speeds Power Tip gets the full benefit of the cooling intake gases. It "keeps cool" to check destructive pre-ignition.

Fits all these cars with overhead-valve V-8 engines using 14 mm. spark plugs . . . Buick, Cadillac, Chevrolet, Chrysler, DeSoto, Dodge, Ford, Hudson, Imperial, Lincoln, Mercury, Nash, Oldsmobile, Packard, Plymouth, Pontiac, and Studebaker. See your nearest Auto-Lite Spark Plug Dealer.

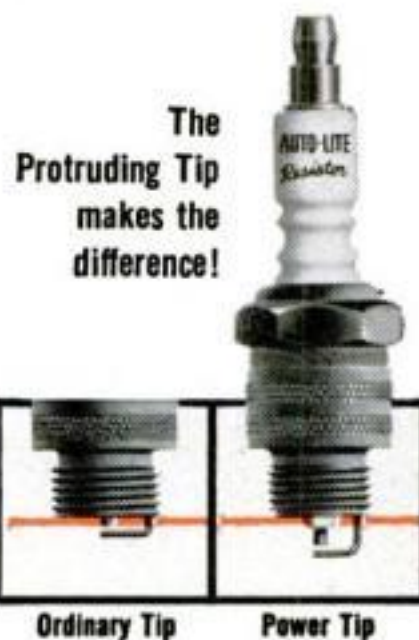
ENGINEERING CHART SHOWS HOW ONLY POWER TIP DELIVERS TOP PERFORMANCE AND ECONOMY AT ALL SPEEDS.



AUTO-LITE RESISTOR SPARK PLUG WITH POWER TIP . . . for all speeds.

# AUTO-LITE **POWER TIP** RESISTOR SPARK PLUG WITH

Auto-Lite manufactures over 400 products, including Spark Plugs, Batteries, Wire and Cable and Automotive Electrical Systems . . . sold throughout the United States and Canada.





Everyone has his own pet idea of a gadget that he would like to see in general use. These five ideas were suggested by POPULAR SCIENCE readers. What is yours? We will pay \$5 for each one published. Please use Government post-cards only. Write your name and address clearly. Contributions cannot be acknowledged or returned.

## I'd like to see them make...



**FOOT-OPERATED FAUCETS**, to be installed on kitchen sinks. Then you could turn the water on or off easily even if both hands were full of dishes or you were carrying a big roasting pan.—Mrs. Barbara Lawler, Jonesville, N. Y.



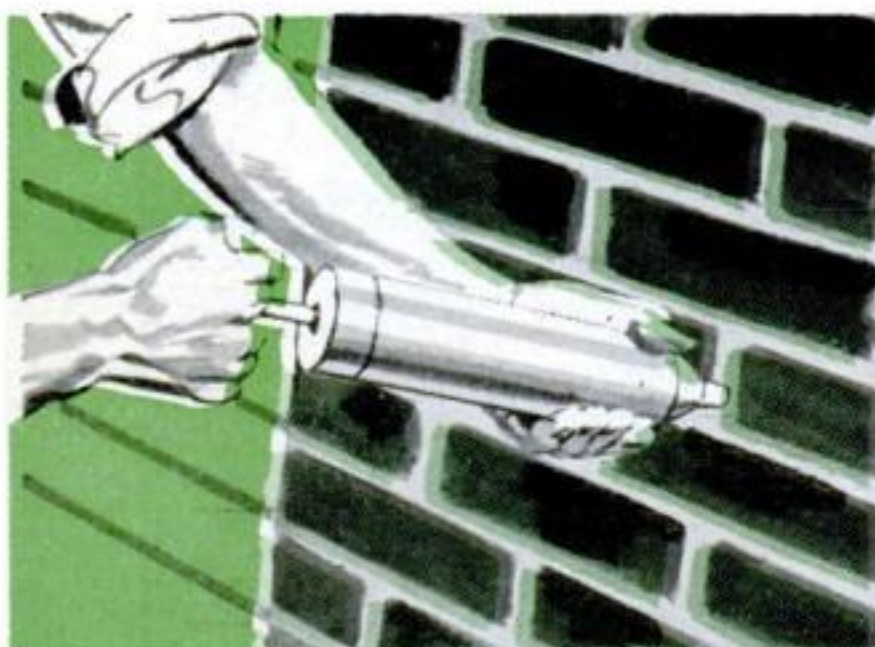
**A RAKE WITH A HOE** on one side. When raking up after weeding, you could chop off any unwanted plants that you had previously missed, without the bother of having to change tools.—John Akers, Colorado Springs, Colo.



**AN AUTOMATIC BRAKE** that would lock when the ignition was turned off. There'd be no more accidents caused by children releasing the brakes, or by empty cars rolling downhill.—Verlon Denton, Grand Haven, Mich.



**A TWO-PIECE ARCHERY BOW** that could be taken apart and fitted into a knapsack for convenient carrying. One piece would screw into the other at the center to assemble the bow.—Roger Morin, Church Point, Nova Scotia.



**A BRICK REPOINTER** that was made like a caulking gun. Then do-it-yourself fans without the skill needed to use the regular tools could turn out a really professional-looking job.—Claude C. Fogelman, Northampton, Pa.



**Just what paste wax needed - a built-in cleaner !**



**Johnson's J-Wax**  
**new Paste Wax Discovery**  
**does the cleaning work for you!**

LONG-LASTING WAX  
KEEPS FRESH AND EASY  
TO APPLY IN THIS  
NEW  
KEY-OPENING  
CAN

**Start right in waxing! No extra  
cleaner needed—nothing else to buy!**



Here's what you've been waiting for—a paste wax with a cleaner built right in! Johnson's new J-Wax saves you hours of pre-cleaning. J-Wax takes the dirt off for you—replaces grime with a crystal-clear coating of wax. Even the dirt you can't wash off loosens instantly and disappears as you rub on this new self-cleaning paste wax.

Then watch the high brilliant luster that comes as you buff. J-Wax sets smooth and hard—bonds itself into a long-lasting wax-tight seal. Gives your car tough wax protection it needs for any weather. And look! The colors are far brighter, truer—even the chrome glistens.

Get your car ready now for the months ahead—with J-Wax. It's the easiest, fastest way to genuine wax protection—*paste wax protection!*



Have you recently completed a project of which you are particularly proud? Send a good picture, with the negative and a brief description, to POPULAR SCIENCE MONTHLY's Mechanics and Handicraft Editor, 353 Fourth Ave., New York 10, N. Y. We will pay \$10 for each item accepted.

## Craftsmen At Work



**Water-Tank Dragon.** Rube Chernenikoff of Washington, D. C., turned this old tank into a play dragon. Legs, tail and neck are pipe in existing threaded holes; head is wood.



**Tractor Lift.** A bucket-carrying hydraulic lift runs off this tractor made by Lloyd Yamamoto of Los Angeles. The six-hp. tractor engine has nine speeds forward and three reverse.



**Astronomical Camera.** Grinding his own mirror and lens, Dennis Lee Johnson, 17-year-old senior at Phillips Exeter Academy, won a science-talent prize with this camera. It takes an unusually large field of stars.

**World Map in Plaster.** To fill a wall area interestingly, Dwight Divine of Orlando, Fla., reproduced four-inch-square sections of a contour map in plaster, with mountains in relief. He nailed them to the wall with meridians consisting of thin strips of balsa. A frame of manila rope was added later.



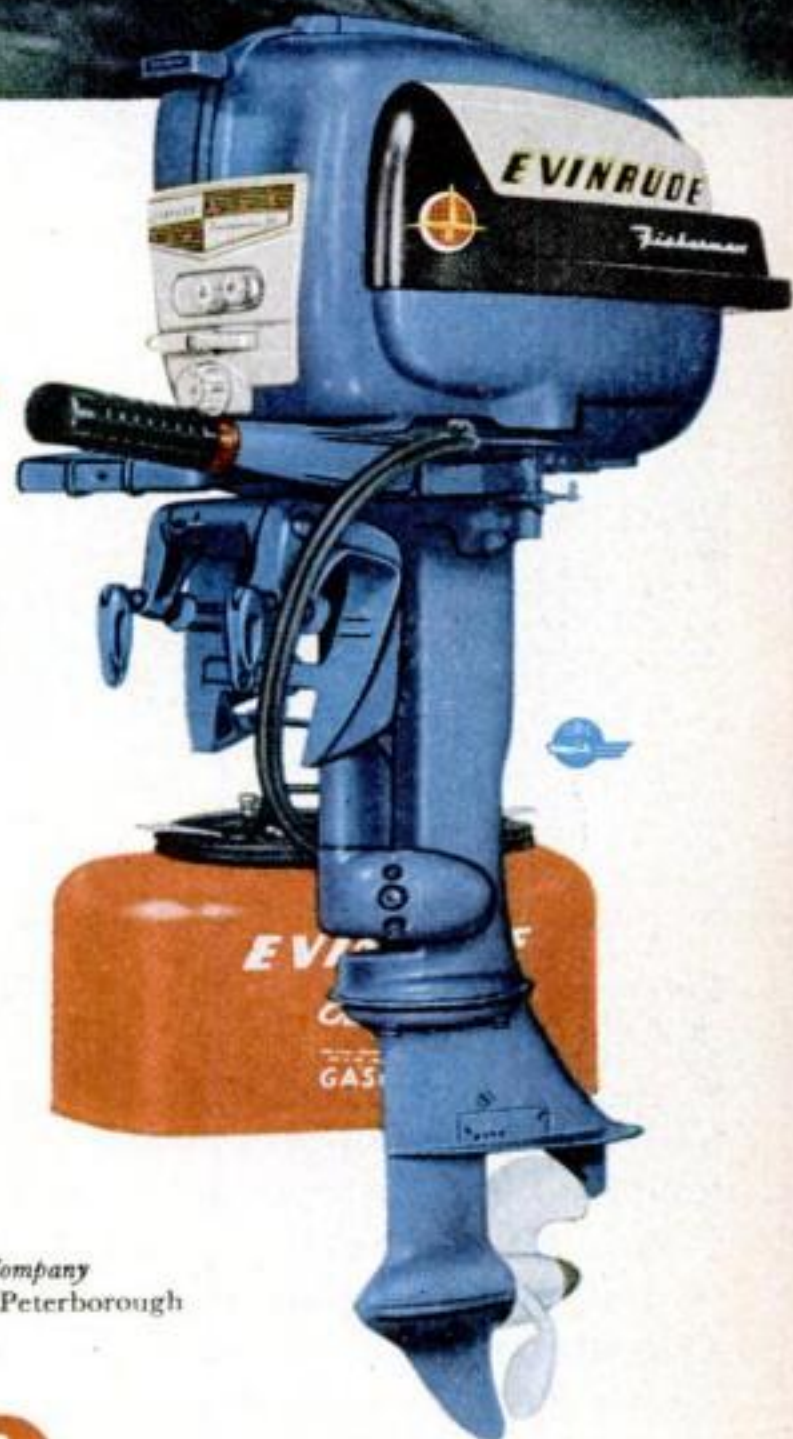


newest one for *fishing fun*



*- quietest too !...*  
**the "Fisherman"**

Behold the Fisherman! . . . never was a motor more patly named! 5½ horsepower, 51 pounds of everything a fishing motor ought to be. *So wonderfully quiet!* Quietest of Whispering Power Evinrudes . . . and that means *quietest of outboard motors.* And so easy to start! With new Eas-A-Matic starting you simply "make a pass" with the Simplex Starter knob—and it starts—that's all! So s-m-o-o-t-h! Breezing home at open throttle—ticking along at slowest troll—*no vibration—none!* There's fuel for all-day fishing in the Cruis-a-Day tank. And Gearshift with neutral, forward, reverse. Roto-Matic speed control, Co-Pilot, Transom Trigger—*everything!* See your Evinrude Dealer—look for his name under "Outboard Motors" in your phone book. **CATALOG FREE!** Write today for full-color catalog of the complete Evinrude line for 1956—nine models, 3 to 30 horsepower. **EVINRUDE MOTORS**, 4274 North 27th Street, Milwaukee 16, Wisconsin.



*A Division of Outboard, Marine & Mfg. Company*  
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**Evinrude**

*quiet Outboard Motors*



# Now They're Planning

**Expansion-house techniques would be used in giant**

**By Herbert O. Johansen, with drawings by Ray Pioch**



**Darrell C. Romick**

**T**HIS is a design for living in space: a dream that will not, of course, come true for many years. It goes far beyond even the proposals for rocket ships or large, manned research satellites that may follow the artificial baby moons sched-

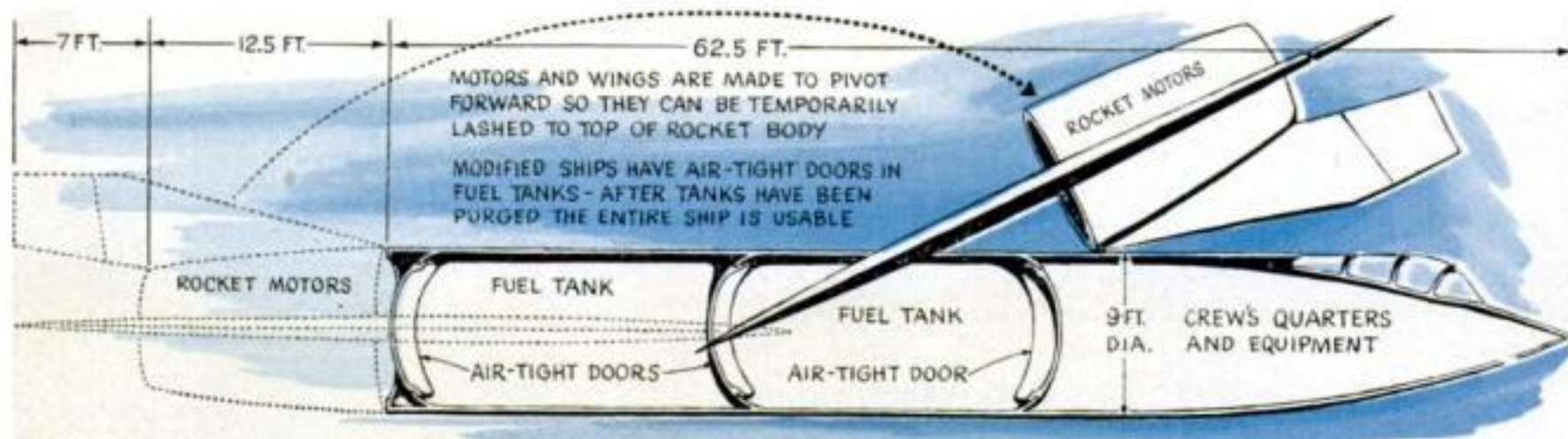
uled to be launched in 1957-58 as part of the International Geophysical Year.

The drawings are based on an engineering study by Darrell C. Romick, a scientist in the Goodyear Aircraft Company's aerophysics department, who

a majestic wheel turning slowly to simulate earth gravity. They would work in a gigantic, 3,000-foot-long, gravity-free structure equipped with scientific laboratories, telescopes, radar, earth-scanning television cameras—with facilities for docking, launching and repairing rocket ships, and even constructing them for the exploration of outer space.

Last year Mr. Romick presented to the American Rocket Society a proposal for a three-stage rocket, the last stage of which would be a ferry vehicle to supply a space station (PSM, Apr. '55, p. 138). Now Mr. Romick, in a sequel engineering study, has shown how such ferry-stage rockets could become the initial building blocks for a space station.

As needs arose, it could be expanded



**Ferry rockets would be adapted in space to become initial building units for the station.**

worked with artist Ray Pioch in preparing this presentation of his proposal for POPULAR SCIENCE MONTHLY.

Mr. Romick's study is a bold blueprint for an *inhabited* space station, a sky city that would house thousands of people. They would live normal family lives in

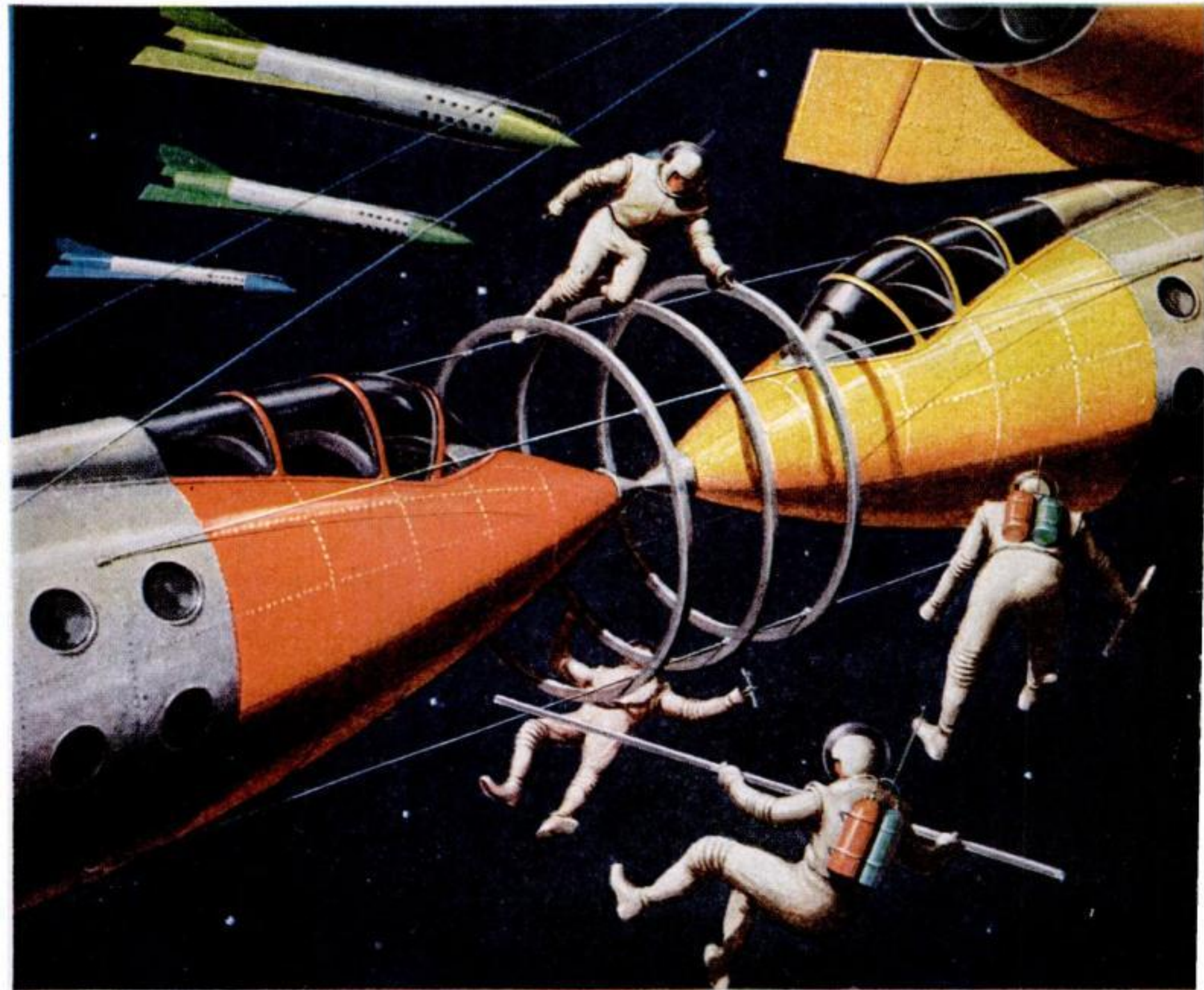
until completed years later as a vast earth-orbiting community. Solar energy would be utilized for power. There would be apartments, theaters, gymnasiums, supermarkets, a hospital.

On the next six pages the details, as envisioned by Mr. Romick, are shown.



# a City in Space

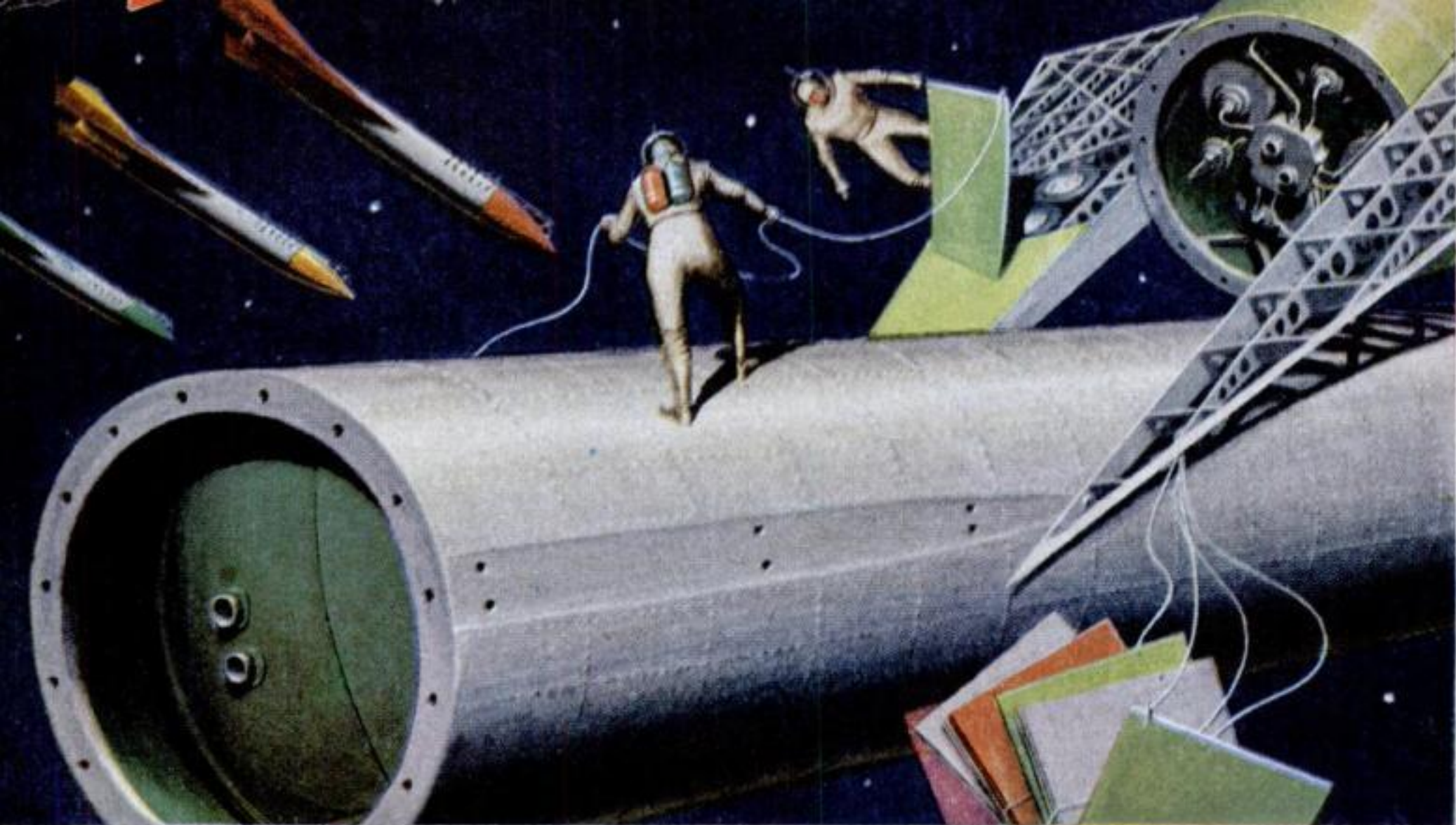
**earth satellite, built to accommodate 20,000 people.**



**1st Day** With the first two ferry rockets nosed together, construction crewmen, wearing pressure suits, will attach cables to them and to support rings that will be skinned over. Rear wing and motor sections have been swung forward (cut-away on opposite page) to be handy for

use later. Fuel tanks have been cleaned so that the entire length of the rockets, nine feet in diameter, can be used as temporary living and working areas. Rockets are pressurized so that space suits need be worn only for outside work. Three emergency ships stand by.



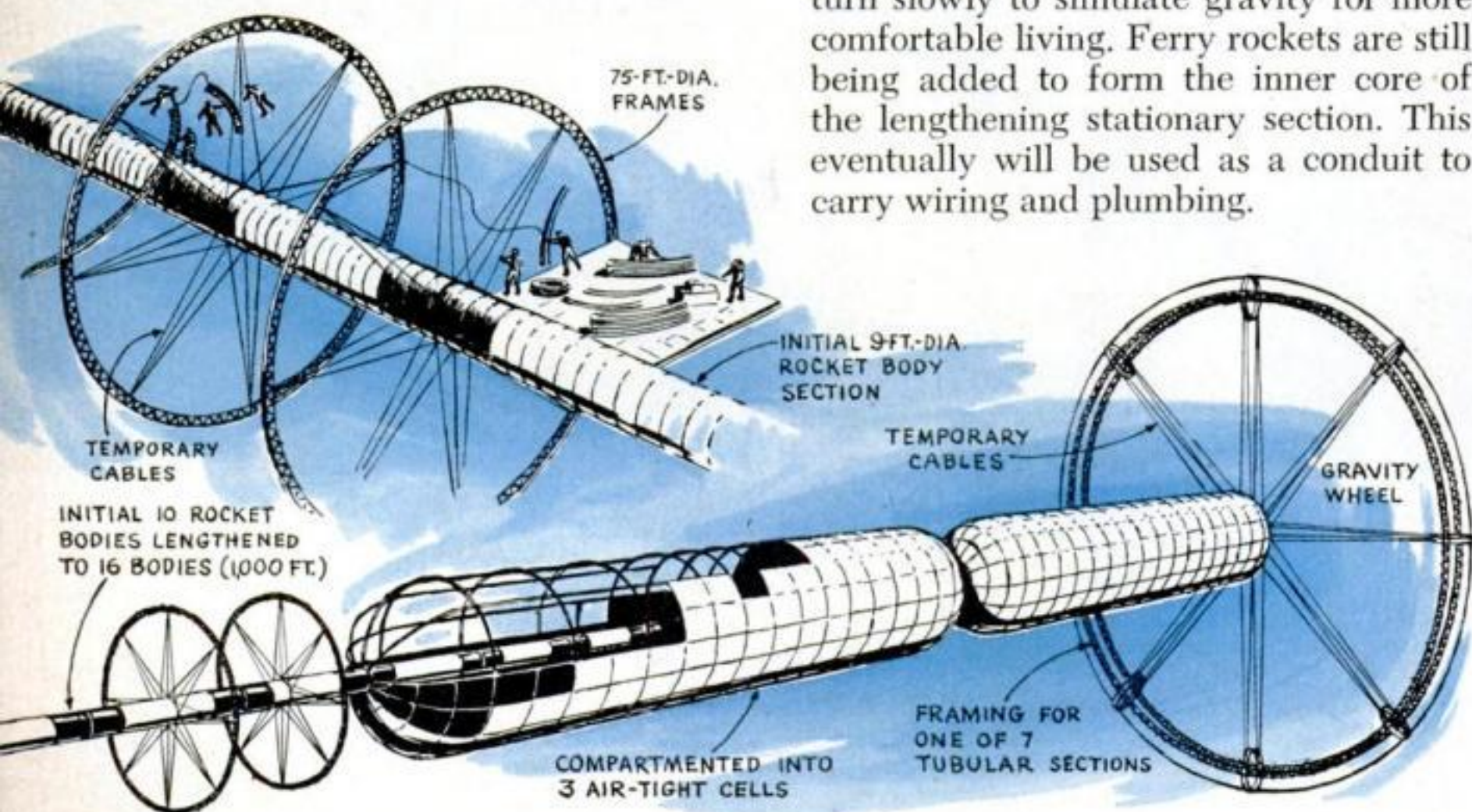


**10th Day** Alternate nosing together and butting of ships progresses rapidly. Here

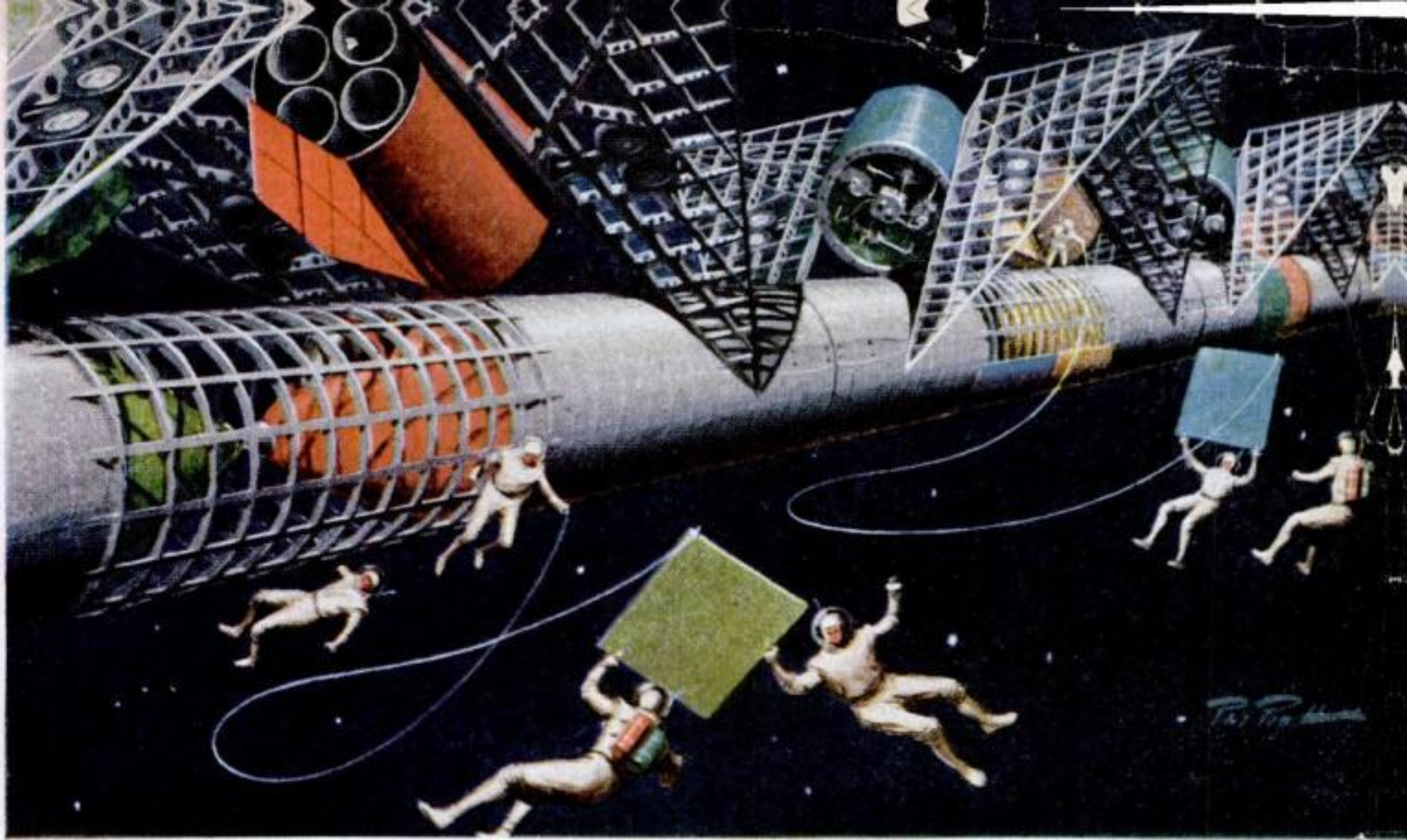
10 have been joined and mostly skinned over, using material from wing sections,

**4th Week** Expansion begins as supply rockets arrive with materials, mainly pre-cut and -drilled sheet stock and formers. A series of 75-foot-diameter circular frame structures along the length of the original tube go up first. Weightlessness makes the materials easy to handle.

**10th Week** One cell of the expansion unit has been skinned over and is occupied by workers and scientists. Simultaneously with work on this stationary, or nonrotating, gravity-free part of the station, construction has been in progress on a wheel, 500 feet in diameter, that will turn slowly to simulate gravity for more comfortable living. Ferry rockets are still being added to form the inner core of the lengthening stationary section. This eventually will be used as a conduit to carry wiring and plumbing.





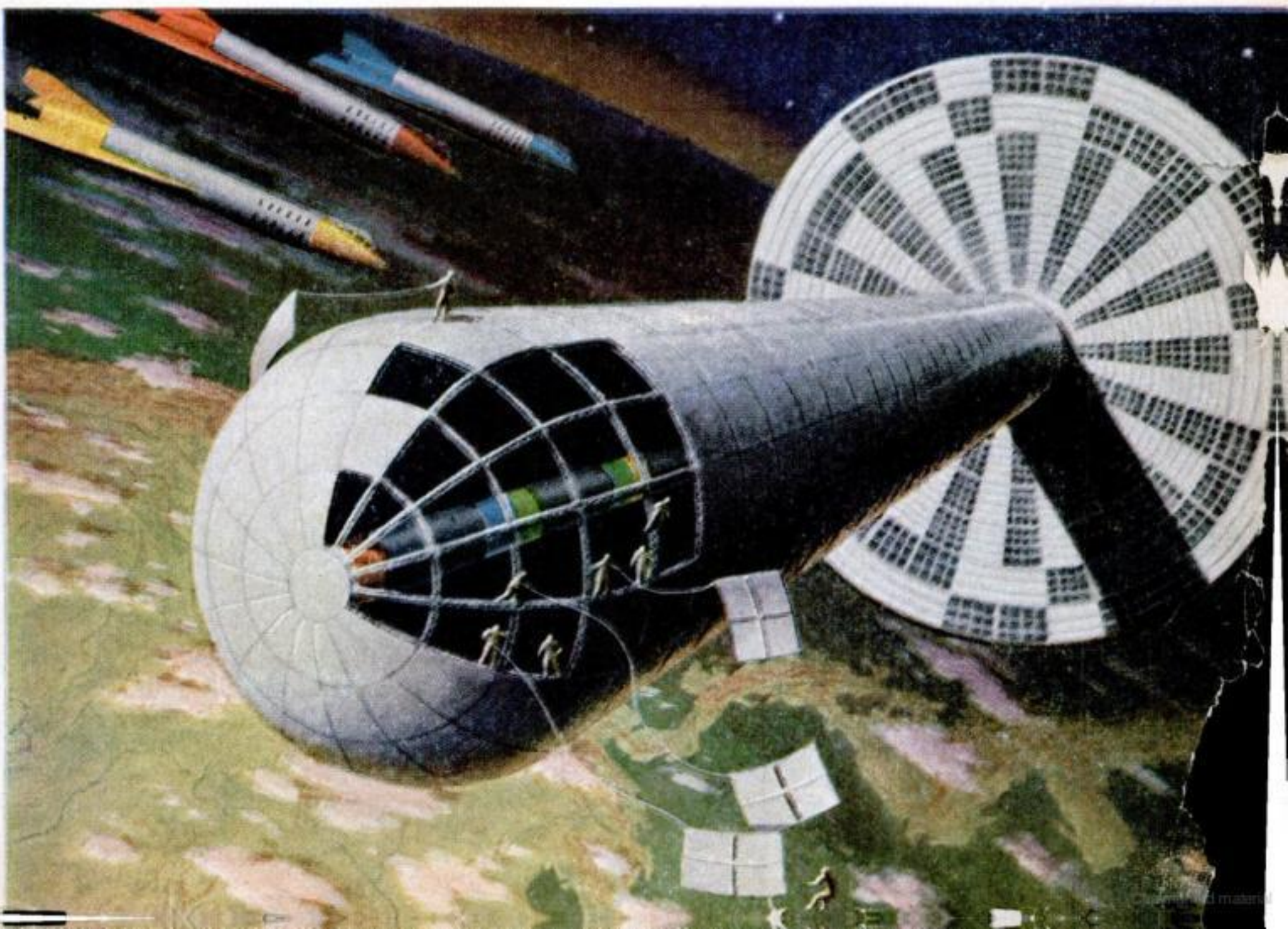


which are now bare. As front ends of two rockets are covered, noses are dismantled

from inside. Continuous tube has compartments with pressure-lock doors.

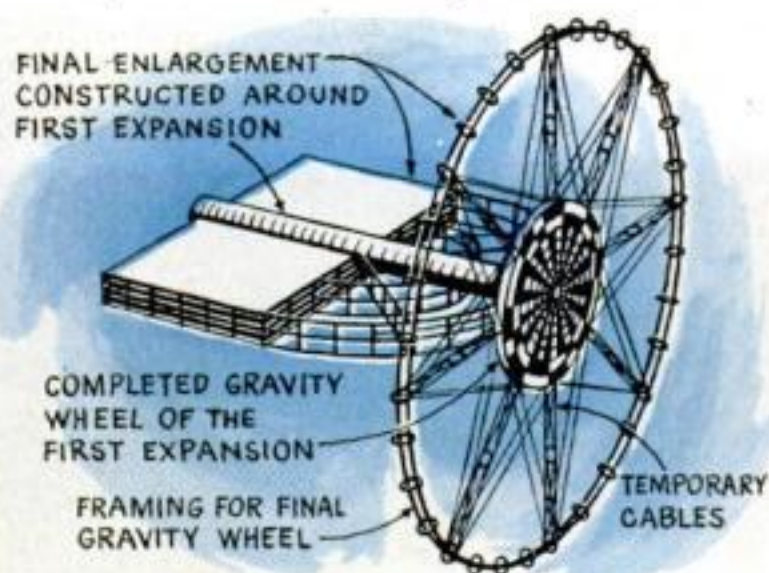
**12th Week** First expansion is almost completed. Gravity wheel is finished, providing 4,000,000 cubic feet of living

space. Stationary section is about 1,000 feet long. Ferry rockets are delivering scientists and maintenance personnel.



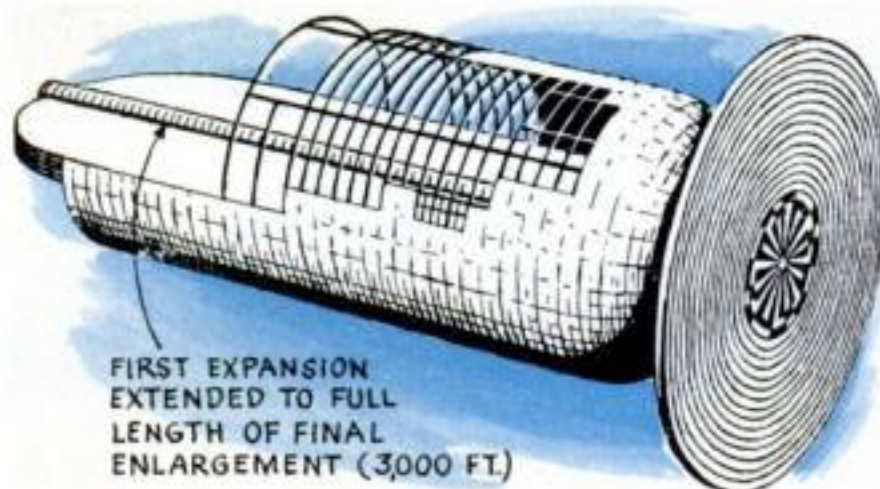


**6th Month** The final enlargement is under way. As the first expansion was built around basic blocks of joined ferry rockets, so the first expansion unit be-

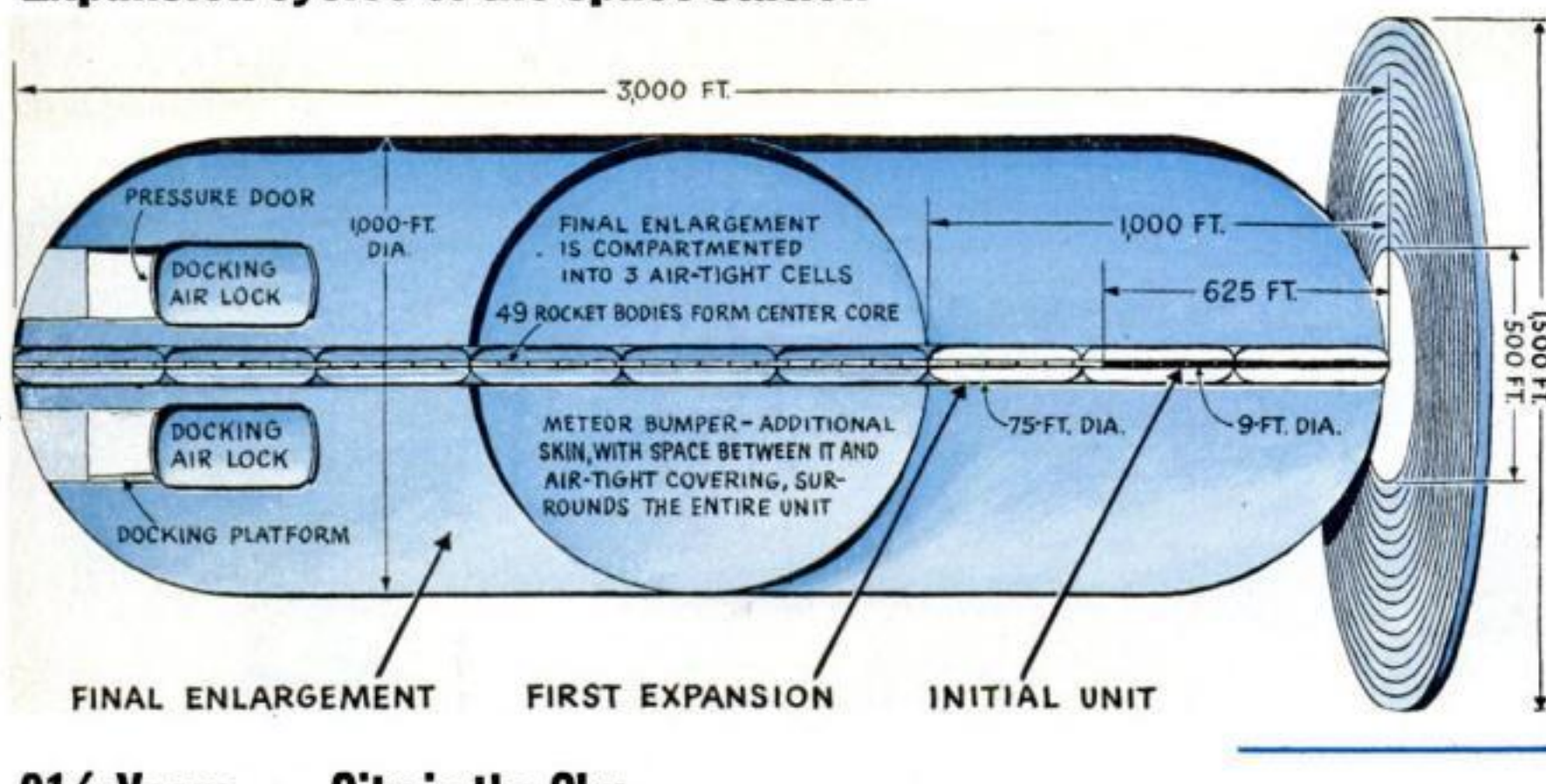


comes the foundation for this evolution from space station to space city. Framework goes up to increase the stationary section from 75 feet to 1,000 feet in diameter, that of the gravity wheel from 500 to 1,500 feet. The satellite is now fully manned and carrying on all its functions.

**2nd Year** Growth continues by the building-block method. Here 49 ferry rockets have been joined to form the continuous core of a stationary structure 3,000 feet long and 1,000 feet in diameter. The enlarged gravity wheel, almost a mile in circumference, is well along. Two ferry rockets a day bring construction materials from the earth. Other rockets are bringing scientific equipment, provisions for an already large space community, furnishings for comfort-of-home living. Visitors are beginning to arrive.



### Expansion cycles of the space station



**3½ Years . . . City in the Sky** Ferry rockets land on the berthing deck to deliver the last loads of construction materials to the vast satellite (facing page) in which more than 20,000 people could now live and work. Two Empire State buildings, one on top of the other, with the Pentagon building rotating at one end, would make a structure far smaller. Seen exposed are observatory domes,

radar antennas, "venetian-blind" windows that can be adjusted to absorb or radiate solar energy for regulating inside temperatures. A thin outer skin, or meteor bumper, protects the inhabitants from direct hits by meteors. Small ones bounce off; larger ones are slowed down so that they are not likely to penetrate the main skin. (For details of the gravity wheel turn to page 98.)



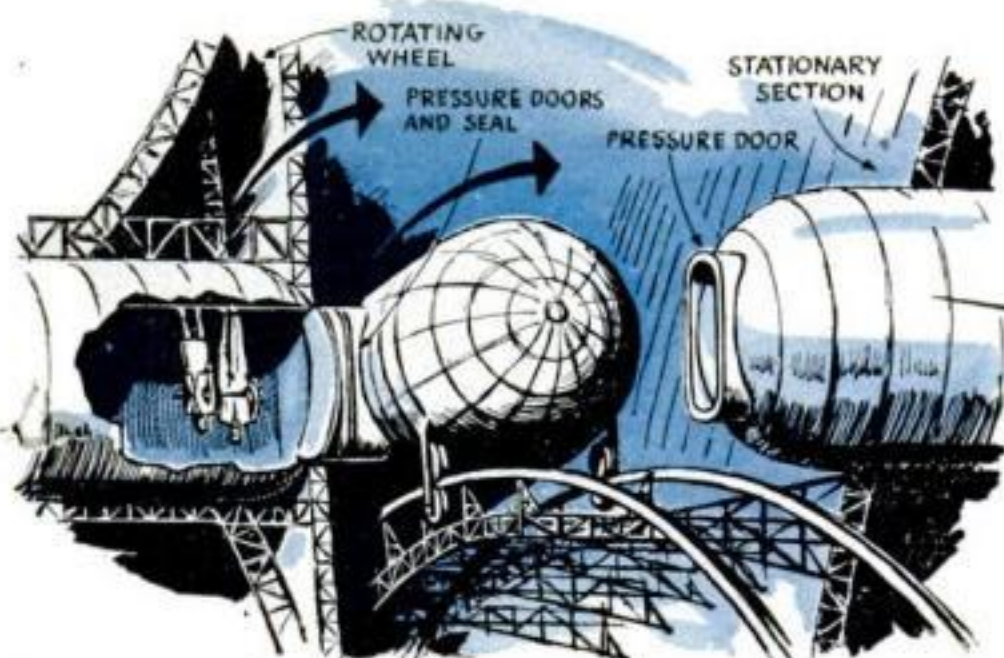




# GRAVITY WHEEL

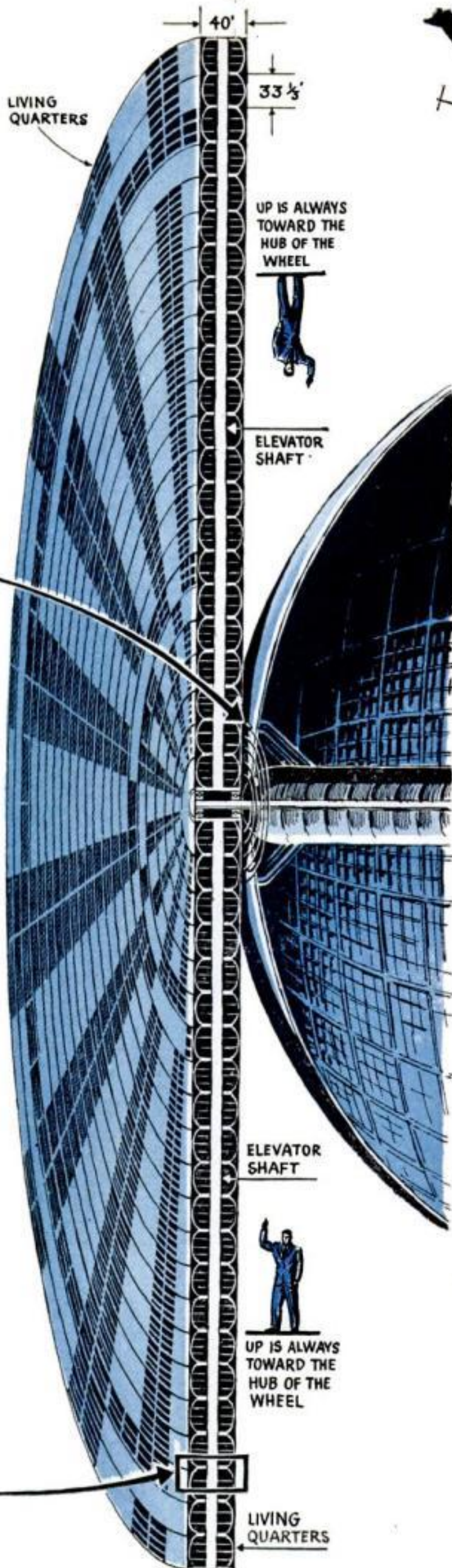
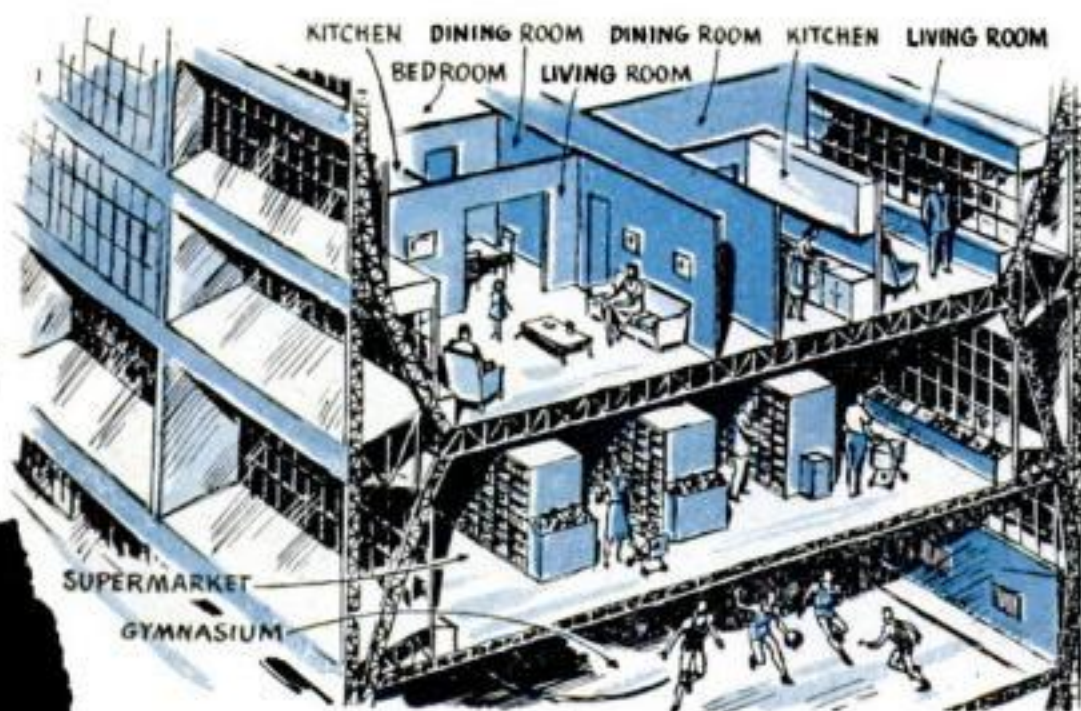


**Balance** of gravity wheel might be upset by unequal weight distribution such as could be caused by a gathering of people in an auditorium. Running weights up or down in shafts would counteract this (left).



**Transfer of personnel** from the turning wheel to the stationary section could be made by cars riding loop rails. As shown in the drawing above, a car door mates with a wheel door in a pressure seal. Passengers get aboard, the door closes, the car disconnects and goes on until it mates with a door into the stationary side. Then it stops, and a reverse pressure-seal transfer is made. Except for the pressure seals, the operation is much like that of an automatic elevator.

**Living in space**, with gravity adjusted to that of earth by rotation of wheel, would be normal.



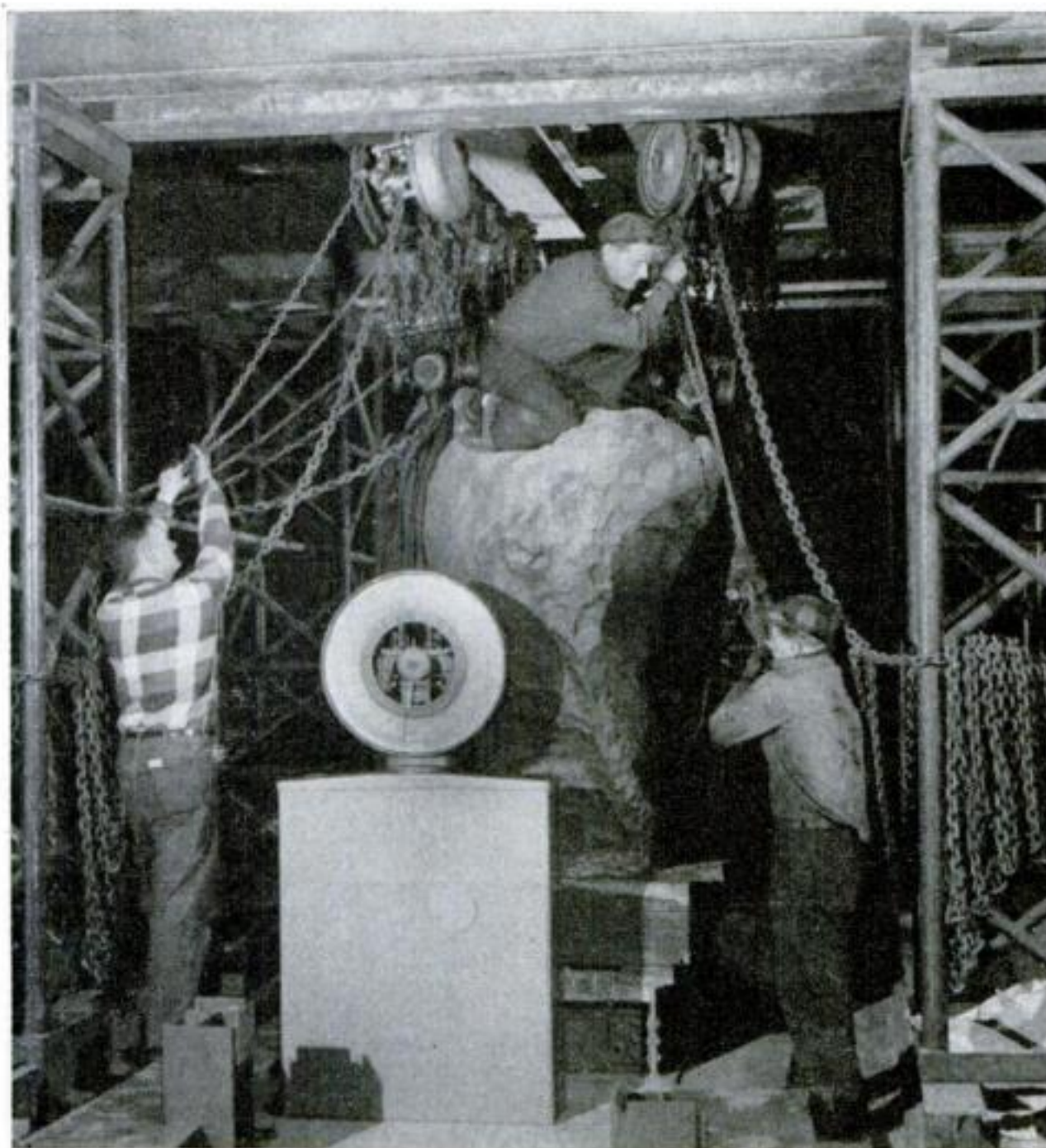




## Tramping Over Relief Map Saves Days of Mountain Climbing

TO LOCATE relay points for a future telephone and TV microwave system to the East, Los Angeles phone engineers took to mountainous Southern California

the easy way—in stocking feet. Using a string, they tramped over a relief map at the Museum of Science and Industry to spot a preliminary line-of-sight route.



## Big Meteorite Weighs In After 62 Years

AHNIGHTO, largest exhibited meteorite, is hoisted by chain and cable in preparation for weighing on the specially built scale in the foreground.

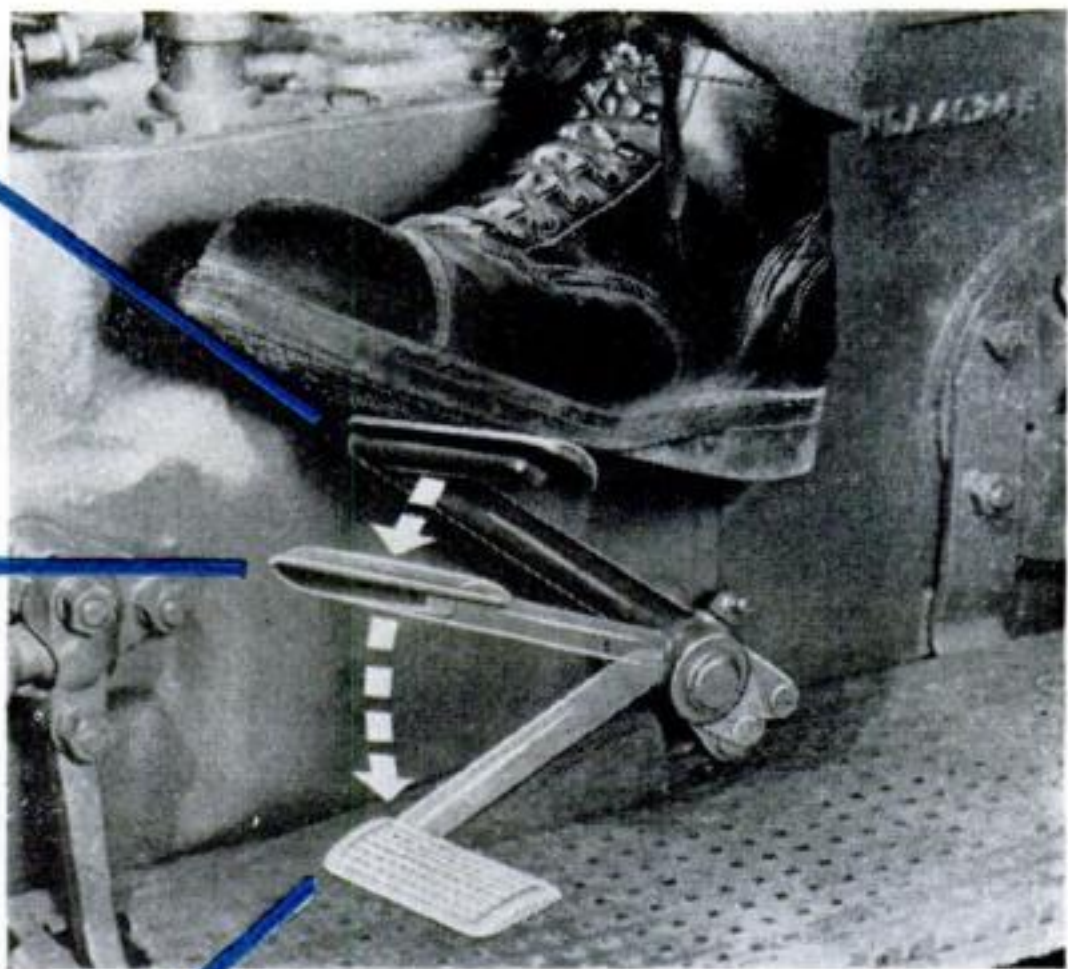
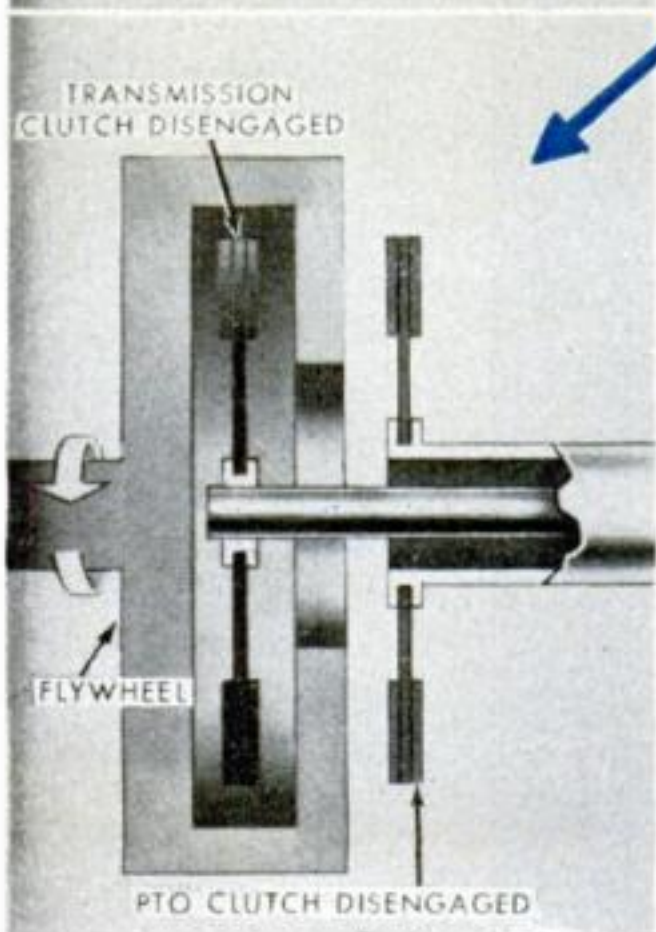
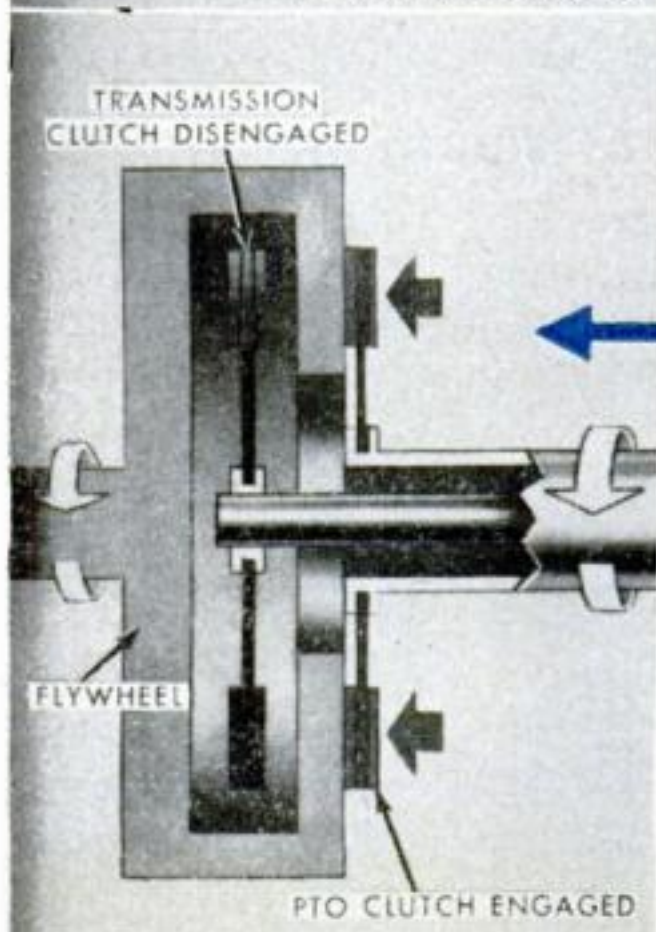
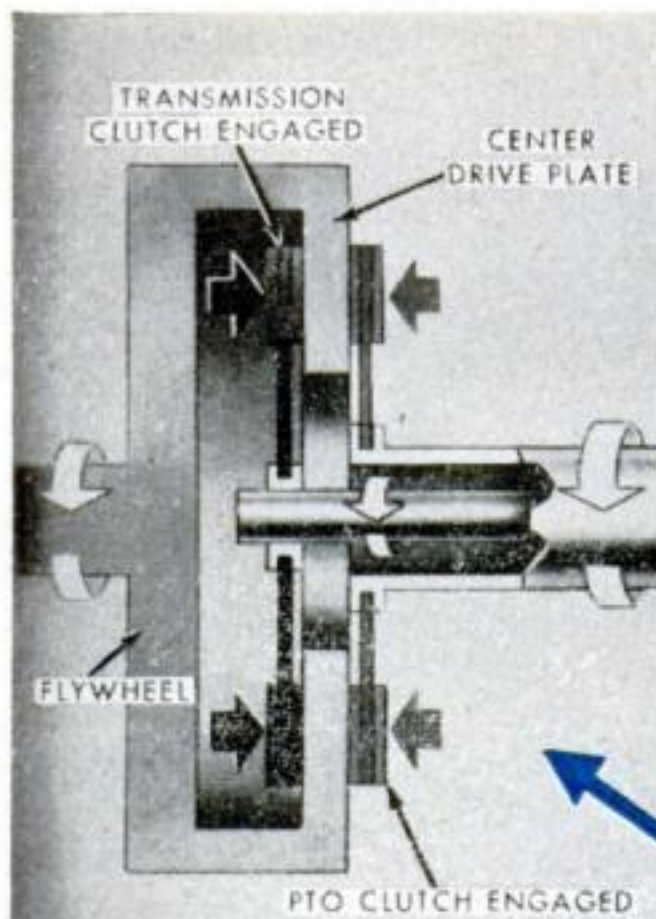
Discovered by Rear Admiral Robert E. Peary in Greenland in 1894 and named for his daughter, the iron and nickel mass is on display on its scale at the American Museum-Hayden Planetarium in New York.

Its weight: just 34 tons and 85 pounds.





# Tractor's New Clutch Does Double Duty



**POSITION OF CLUTCH PEDAL** determines where power goes in new tractor design. A center drive plate accommodates two clutches. The engine drives both tractor wheels and power takeoff when pedal is at top. Pressing it half-way down disengages the tractor wheels but continues drive train to the power takeoff. Fully depressed, pedal disengages the power takeoff.

**A**N "automatic transmission" has now been adapted to the power takeoff on farm tractors to run such implements as combines, corn pickers, hay balers and post-hole diggers. The farmer pushes one clutch pedal to start and stop the tractor, or the power takeoff, or disengage both.

Heart of the system, developed by Ford's tractor and implement division, is a double power shaft—one shaft rotating inside another—with a common drive plate. The system is simpler than either of two other methods commonly used—an extension of the tractor drive shaft for the power takeoff, or an independent shaft with separate clutch and drive train.



A black and white photograph of a large industrial facility. In the center, a massive, cylindrical machine is suspended by thick cables from a crane system. A man in a white shirt and dark trousers stands on the floor, holding one of the control cables. The machine is positioned above a workbench where a crankshaft is visible. The background shows the interior of a large building with various industrial equipment and structural elements.

## Million-Volt X-Ray Tests Engine Parts

BIG enough to X-ray a mammoth's tusks, this million-volt machine has just been installed in a heavily shielded laboratory at the International Harvester Company's research center in Chicago.

Built by General Electric in its Milwaukee, Wis., plant, the unit will be used to detect hidden flaws in engine castings, forgings and heavy weldments.

A technician is shown checking its position above a crankshaft scheduled for radiographic testing. Using the cable-suspended control box in his left hand, he can raise, lower and move the massive machine forward or backward, horizontally.





**"AGAINST THE BRASS"**  
—motorman's slang for having the controller handle up against the wide-open stop—produces only a sedate 30 m.p.h. on the straight-away, because the powerhouse generator is not run at full speed. New club members are not turned loose at controls until they are carefully checked out. Handling the controller is easy, but working the air brake for smooth stops takes some practice.

## You, Too, Can Be a Motorman

**PARLOR-CAR TROLLEY** built in 1904 is the museum's most prized possession. Used originally by top officials of the Connecticut Co. for inspection tours, it has hand-carved oak woodwork, a lavatory with stained-glass windows and a steward's galley for drinks en route.



**ON THE TRESTLE** is a 15-bench open car built in 1906. This big breezy car had seats for 75 people, and a lot more could hang on the sides if the conductor was agreeable. At the controller is E. J. Quinby, an electronics engineer on weekdays.



**O**LD elephants may seek out hidden valleys in which to die, but old trolley cars go to Branford, Conn. On a 1¼-mile stretch of tracks along the salt marshes there, a sizable fleet of old trolleys has found a permanent home. Refurbished and pampered by a little band of enthusiasts, they form a "working" museum of a once-vast transportation system now rapidly disappearing from America.

[Continued on page 248]

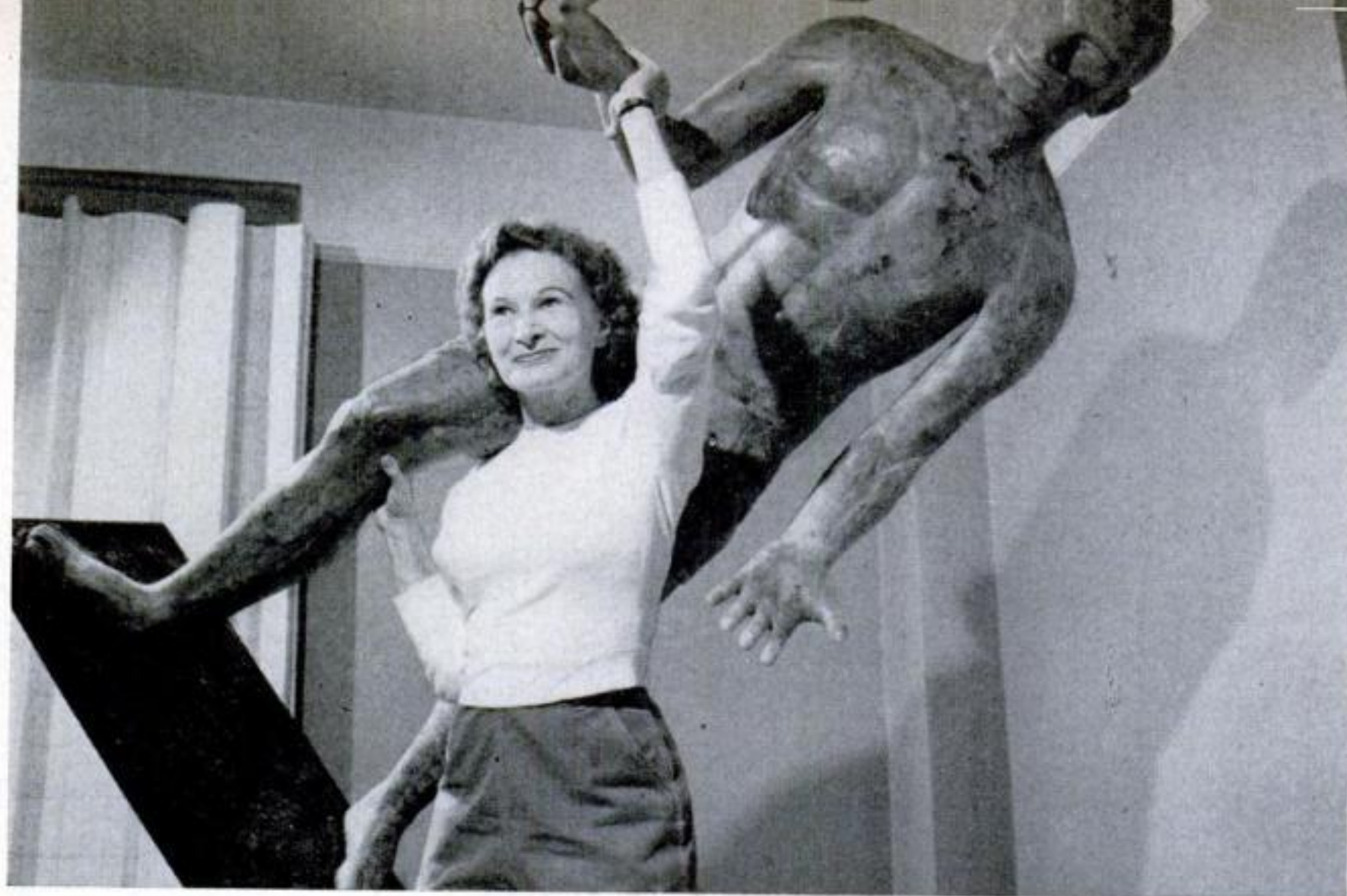
**CHANGING ENDS**, an amateur motorman hooks one pole and sets the other on the "overhead." Running the old cars is the reward for the uncounted hours of work it takes to restore them.



**LAST SINGLE-TRUCK OPEN CAR** in U. S. still in working condition, Old 34 (right) has gone a long way since it was built in 1899. Note the "Armstrong" brake handle—it took a strong-armed motorman to crank up the brass gooseneck when he needed to stop the car in a hurry. Experienced motormen always rode with the slack all taken up.







### **Sculptress Molds a Featherweight Statue from Glass Fiber**

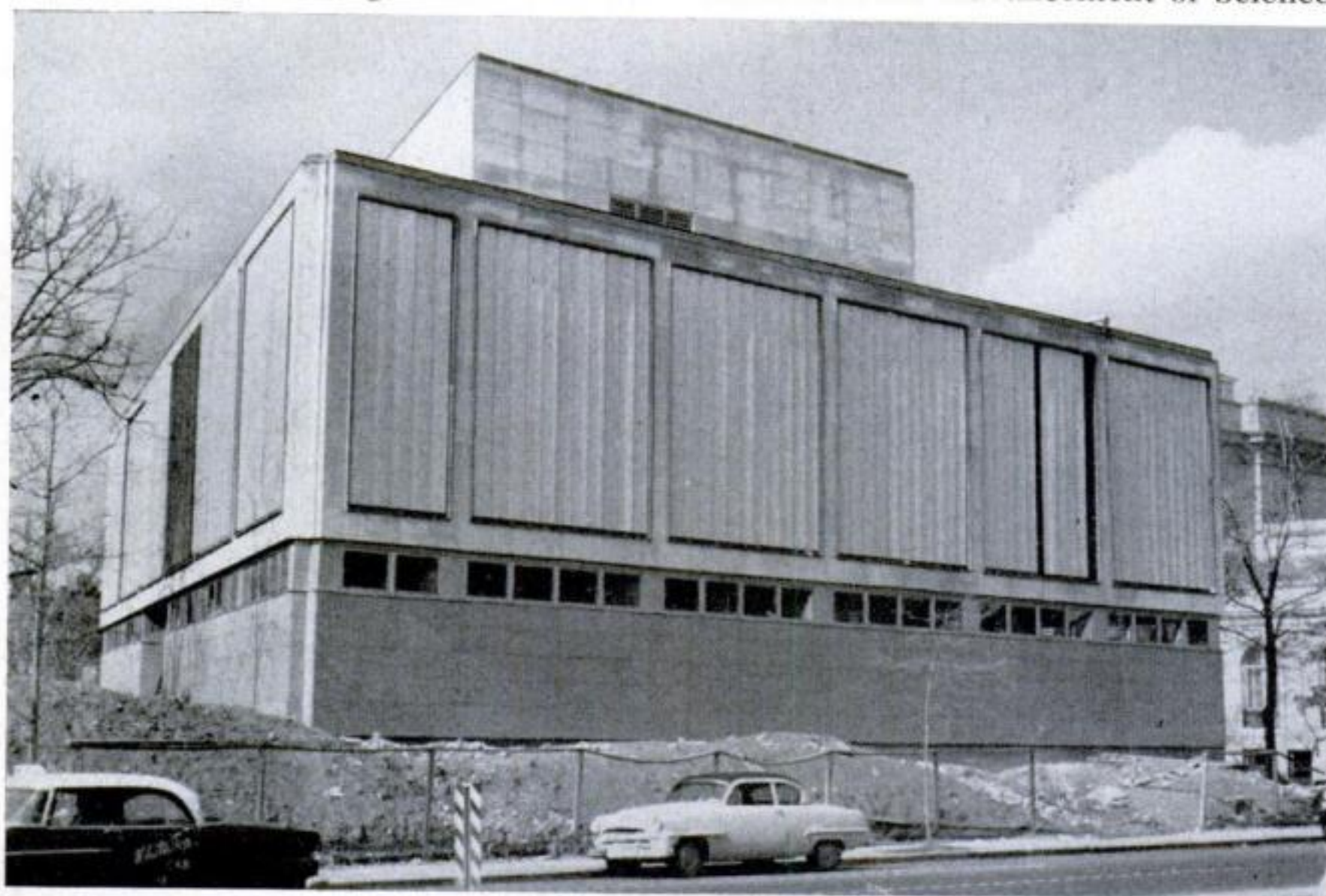
THE lady above is not a judo expert. She's noted sculptress Anita Weschler, shown shouldering her latest statue—a

glass-fiber and polyester-resin figure that weighs only 50 pounds. Cast in bronze, the statue would weigh 700 pounds.

### **Time Clock Turns Giant Window Louvers to Keep Out the Sun**

LIKE sunflowers, the 19-foot aluminum louvers in the walls of this new Washington, D. C., building turn to face the

sun, regulated by a time clock. The building is owned by the American Association for the Advancement of Science.







### **Gasoline miser shows you two secrets of his success**

**BEFORE FUEL-SAVING TEST**, Andy Henderson (right), veteran Economy Run driver, always installs vacuum gauge and flow meter in a duplicate of the car he'll drive, to find out how to handle it to achieve highest economy. In the close-up view above, he shows the proper pedal position of the crucial right foot. Its pressure and steadiness on the accelerator largely determine whether driving is economical or wasteful. Here's the recipe: Dig your heel firmly into the mat, lock the right side of your foot against the drive shaft, and let the ball of the foot rest comfortably on the accelerator pedal.

# Is Your Right Foot Costing You Money?

***Economy Run winners tell how you can soft-pedal your engine into a third more gas mileage.***

**By Wesley S. Griswold**

**W**ANT to get as much as a third more mileage out of each gallon of gasoline your car burns? Would you like to add thousands of miles of stopping power to your brake linings? Relish the idea of riding around on cushiony tire tread at a time when you would normally expect to have baldies on your wheels?

Then draw up a chair and listen to two







**BANG GOES ECONOMY** when a driver, trapped for a while behind a slow vehicle, puts on a

burst of speed when free. One veteran driver missed an Economy Run sweepstake that way.

men who can tell you how to do it. They are proven experts at the sort of driving that produces the kind of results indicated above.

One of them, slight, handsome 26-year-old Mel Alsbury Jr. of Hollywood, Calif., won the coveted sweepstakes award in this year's Mobilgas Economy Run. Alsbury, driving a four-door Imperial Southampton, beat his nearest competitor by almost 10 ton-miles per gallon. He averaged 21.04 miles per gallon over the exceptionally stiff 1,468-mile course.

It was only his second try for Economy Run honors.

The other, Woody Bell, is a young, ruggedly built, used-car salesman for a dealer in La Crescenta, Calif. In five runs prior to the 1956 competition, he twice won first place in his class and twice placed second.

This year, at the wheel of an Oldsmobile 88 Holiday sedan, he won first in the medium-price class.

The award-winning austerity of their contest driving doesn't represent merely a supreme, once-a-year effort for these men. They get similar results all the year 'round with their own cars.

Alsbury, who drives a Chrysler, and Bell, who drives an Olds, say the way they habitually handle a car will regularly stretch the lifetimes of both brake linings and tires to between 35,000 and 40,000 miles and coax five to six miles more out of a gallon of fuel.

How do Alsbury and Bell do it?

Their personal driving rules differ

slightly, but they include these eight principal points:

**1. Drive with a light foot** on the accelerator pedal. Uphill, downhill, around curves, in city traffic, the position of that foot mustn't vary any more than you can possibly help.

**2. Never use more than quarter throttle**, unless a sudden crisis forces you to. This automatically excludes fuel-eating jack-rabbit starts and impromptu races when the traffic light changes.



**HERE'S WHERE IT PAYS** in fuel mileage to let your car's momentum do most of the work of taking it down one hill and part way up the next. This shot was made on last year's Economy Run.



**3. Accelerate and decelerate easily** and steadily. Don't let the engine "lug." Don't ever slam on the brakes hard, except in a real emergency.

**4. Keep your eyes six car lengths ahead** when driving in city traffic, to avoid unnecessary stops. Glance frequently at the next two traffic lights ahead. Try to go through the first light just as it changes to green, then keep the speedometer needle as close as possible to the posted speed limit. Drive as much as you can in the lane that seems to be moving at the steadiest pace.

On the 1956 Economy Run, there were scores of signal-controlled intersections, for the route lay through a dozen cities and a great many small towns. By following Rule 4, Alsbury got through all but a small number on the green light.

**5. Drive fast enough on downgrades** in rolling open country so that the car's momentum will carry it part way up the hills. This way, you won't have to vary your pressure on the accelerator very much to top the rises.

**6. Wear heavy-soled shoes.** Bell chose leather ones. Alsbury wore tennis shoes with heavy crepe rubber soles. Such a sole insulates your right foot from vibration and heat and makes it easier for you to keep it steady. On long drives, keep your shoes loosely laced, to maintain good circulation in your feet.

"That last precaution doesn't apply to one Economy Run driver I know," says Bell. "He says he's kinda glad when his right foot goes to sleep; it becomes steadier on the accelerator and his mileage improves.

"The story got around one year that some of the Economy Run contestants were driving with their right feet bare and, what's more, had sandpapered the bottom for greater sensitivity. If that was true, I hate to think what it did to their driving.

"The heat and the discomfort must have been darn near unbearable. They couldn't possibly have kept their feet



**ON A LONG, GENTLE UPGRADE**, like this bit of the 1955 Economy Run, the average car performs most economically at 40-45 m.p.h., says Woody Bell; on similar downgrades, at 50-55.

steady on the accelerator. And steadiness counts more than almost any other factor in driving economically."

**7. In bad weather, go slower** but keep the car in motion as much as possible. On snow or ice, never let the rear wheels stop or lose traction if you can avoid it. This way, you are in far less danger of skidding and you are also much less likely to get stuck, thus using up a lot of gasoline and rubber needlessly, as you try to work your way out.

**8. Keep your car in good condition.** That means making sure that the air and oil filters are clean, the brakes are not dragging, the wheels are packed and balanced, the carburetor is tuned, the ignition and timing are right, the spark plugs are clean and properly set, and the air pressure in the tires is kept right around 28 pounds.

"I'd say, get an engine tune-up every 5,000 to 8,000 miles for highest economy," Alsbury advises, "especially if you do a great deal of city driving. But, in my opinion, the secret of saving money in car operation is still about 90 percent dependent upon the *way* you drive."

In addition to these primary rules for economy in average driving, Alsbury and Bell have useful pointers for the man who has to make long trips.

Alsbury, on long drives, always aims to average 50 miles an hour. He likes to start the day's run around five



o'clock in the morning and be off the road for the night by 7:30.

*If the day is sunny*, he wears dark glasses; road glare tires his eyes and makes him feel weary all over. Fatigue makes his accelerator foot erratic, causes his judgment to wobble, and increases the possibility of an accident.

At the start, he carefully adjusts the front seat to its most comfortable position, for the attitude of his body affects the balance of his right foot, which mustn't be too heavy or too light on the accelerator. Once or twice toward the end of every day's driving, however, Alsbury changes the position of the front seat slightly.

This alters the attitude of his body just enough to produce a temporary feeling of relaxation.

*Out in the desert*, he keeps the needle at 60 to 65, hour after hour, but he remembers to glance away from the road frequently—"to avoid getting hypnotized by that white line."

Bell makes a point that wouldn't occur to most drivers on long trips. Because of his experience on Economy Runs, he is always keenly alert to the direction from which the wind is coming.

Whenever the wind is at his back or coming from the side, he drives faster than he normally would, if he knows that, farther on, his route will take him straight into the wind.

"A headwind raises the devil with fuel consumption if you don't slow down," he says. "So I make my extra speed when the wind is with me. Then I can afford to take the time to go slower when I have to face into it."

*The importance of accelerator technique* can't be emphasized too much if you want to cut the costs of operating a car, Alsbury and Bell agree.

Another authority on the subject puts it most colorfully. Art Pillsbury, Regional Director of the Sports Commission of the U.S. Auto Club, sponsors of the 1956 Mobilgas Economy Run, says, "You've got to think all the time that there's an unbroken egg under the pedal, and you mustn't crack it." END

## Imperial Wins 1956 Economy Run



AN IMPERIAL sedan is waved across the finish line at Colorado Springs as winner of this year's Mobilgas Economy Run. The driver is Mel Alsbury Jr., young Korean war veteran who is general manager of his father's Chrysler agency in Hollywood. Considering car weight, as well as the amount of fuel used, Alsbury squeezed more ton-miles from his gas than any of the other 18 drivers who made the 1,468-mile cruise from Los Angeles in four days at an average speed of 41 miles an hour.

### HOW THEY RAN:

| MAKE & MODEL                      | DRIVER          | MILES PER GAL. | TON-MI. PER GAL. |
|-----------------------------------|-----------------|----------------|------------------|
| <b>LIMITED-DISPLACEMENT CLASS</b> |                 |                |                  |
| Rambler 6                         | Tommy Thomas    | 24.3545        | 48.2218          |
| Studebaker Champion 6             | Bob Russo       | 20.0467        | 39.7426          |
| <b>LOW-PRICE CLASS</b>            |                 |                |                  |
| Ford Customline 8                 | Marshall Martin | 20.5217        | 47.7643          |
| Plymouth Belvedere 8              | Art Rene        | 20.6793        | 47.7381          |
| Chevrolet Bel Air 6               | Pete Novotny    | 21.1715        | 47.2124          |
| Chevrolet Bel Air 8               | James L. Rush   | 20.7032        | 46.3752          |
| Ford Fairlane 8                   | Don Rice        | 18.7496        | 44.2490          |
| <b>LOW-MEDIUM PRICE</b>           |                 |                |                  |
| Pontiac Chieftain                 | Pierce Venable  | 21.1098        | 51.7297          |
| Dodge Coronet 8                   | William Loshier | 20.9012        | 50.1419          |
| Mercury Montclair                 | Art Elliott     | 19.1552        | 47.6965          |
| <b>MEDIUM PRICE</b>               |                 |                |                  |
| Oldsmobile 88                     | Woody Bell      | 19.7044        | 50.8077          |
| Nash Ambassador 8                 | Carl Chakmakian | 20.7124        | 47.9907          |
| Hudson Hornet 8                   | Lee Hamer       | 20.4894        | 47.4944          |
| <b>UPPER-MEDIUM PRICE</b>         |                 |                |                  |
| Oldsmobile 98                     | Ray Brock       | 18.6694        | 50.9488          |
| Buick Super                       | Don Bridges     | 17.7798        | 48.9566          |
| De Soto Fireflite                 | Danny Eames     | 17.8341        | 47.3496          |
| <b>HIGH PRICE</b>                 |                 |                |                  |
| Imperial                          | Mel Alsbury Jr. | 21.0420        | 61.3796          |
| Packard 400                       | Dick Johnson    | 18.0750        | 50.3207          |
| Buick Roadmaster                  | Al Cottle       | 17.4191        | 48.2510          |
| Average, all cars                 |                 | 19.9536        | 48.6511          |





## Track-Hopping Switcher Gets to the Job Fast

NO LONGER than your auto, this rubber-tired switch engine can pull or push eight loaded freight cars. Moving them, it straddles the rails, riding the ties on five-foot-diameter, low-pressure tires. But going to jobs it can take off on a beeline across tracks, pavement or fields.

Powered by a 208-hp. General Motors diesel, the Switchmobile has a four-wheel, torque-converter drive with four speeds forward or reverse. When the operator changes direction he swings the control panel (left) in front of the seat that faces the way he's going. LeTourneau-Westinghouse made this pilot model for the Pennsylvania Railroad.



## Pen-Size Radiation Detector Tells GIs When They're "Hot"

A RUGGED midget detector, worn clipped in a breast pocket like a fountain pen, records the amount of deadly gamma radiation that the wearer's body has absorbed. Its simple scale can be read at a glance for a warning that treatment may be needed. In emergency use the "pen" can be recharged by a trained TV or radio repairman.

Tested by the Army Signal Corps at Fort Monmouth, N. J., the personal radiometer is ready for mass production.





# You Can Be First to See a Satellite

**Start training now to help scientists locate and trace the orbits of man-made moons that will circle the earth.**



**By Herbert O. Johansen**

**W**OULD you like to be the first man to shout, "I see it!" when the first artificial moon comes over the horizon?

Would you like to be the last person to spot one before it plunges into the ocean of air above us and disintegrates?

Thousands of observers will be needed to keep track of the artificial satellites that the United States is preparing to rocket into space during the International Geophysical Year. Trained amateur astronomers, of whom there are more than 5,000 in this country, already have been asked to help observe these satellites. You, too, will be invited to help if you are willing to start training right now to be prepared and qualified when this spectacular research project begins next summer.

**The first satellite** is expected to be launched from Patrick Air Force Base near Cocoa, Florida, shortly after July 1, 1957. Official observers will track it both visually and electronically. They will have special wide-angle Schmidt camera-telescopes at 12 or more permanent sta-

tions. They will report when and where they spot it to an "orbit calculating center" at Cambridge, Mass., where a staff of experts will try to predict its course on its next trip around the world.

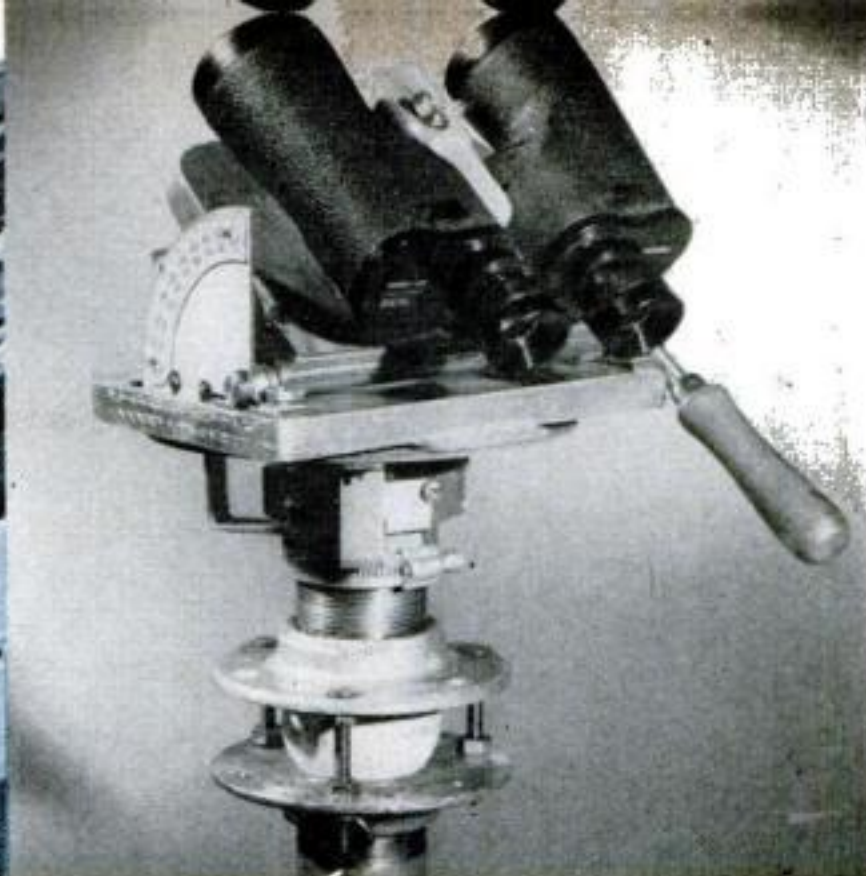
Maps will be prepared showing where and when it should appear. These, the scientists hope, will be shown on TV and published in daily papers. Alerted by these maps, you and thousands of other amateurs will be able to see a satellite when one comes your way.

You might even see a satellite this year! The Russians have announced that they plan to get an artificial moon up before the end of 1956. If they succeed, trained visual observers are likely to be the first Americans to spot it.

**Why you are needed:** The satellite will go 18,000 miles an hour. It will circle the earth approximately every 90 minutes. The first one will be launched to assume an orbit inclined about 40 degrees to the equator. It will be so tiny that it will be visible only briefly (shortly before sunrise or after sunset) from any given point. And it will often be hidden from view by clouds.

Hence, observers at the official stations

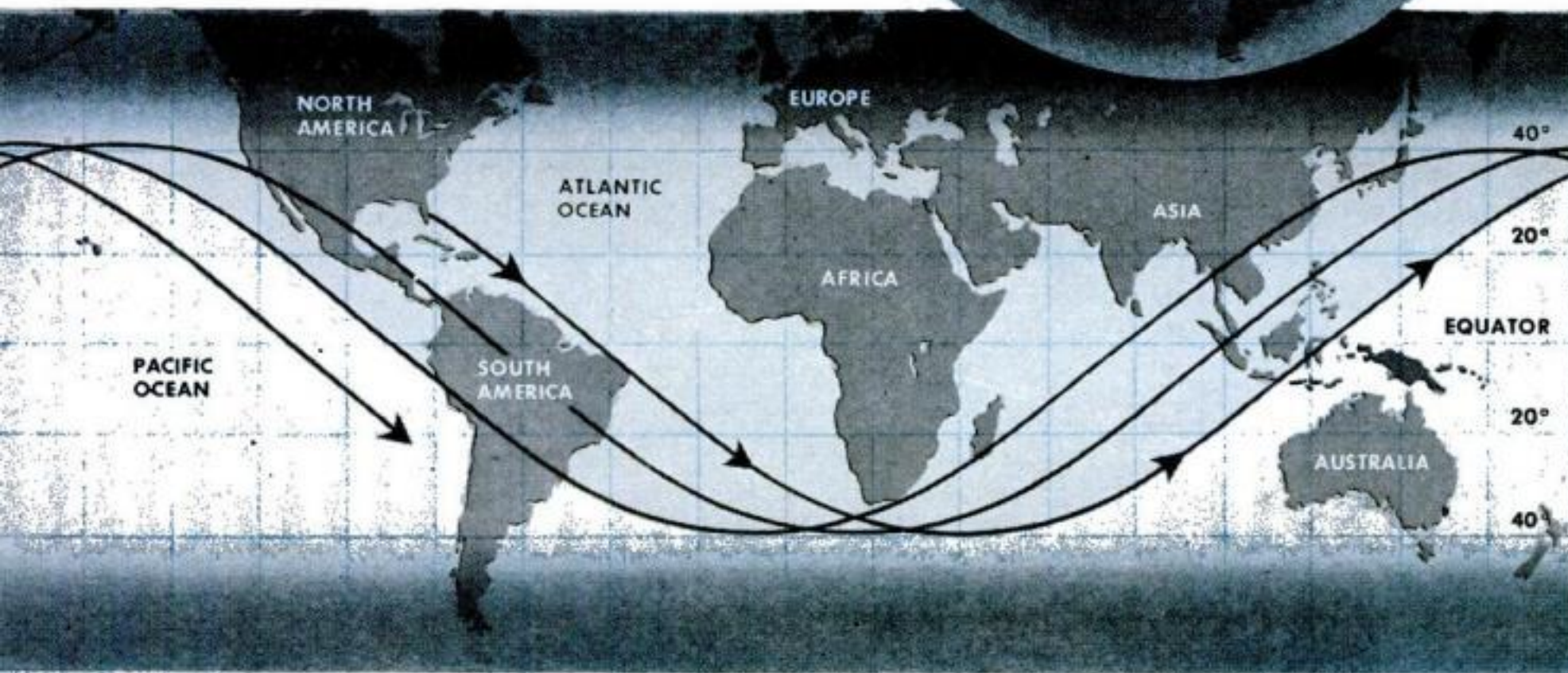
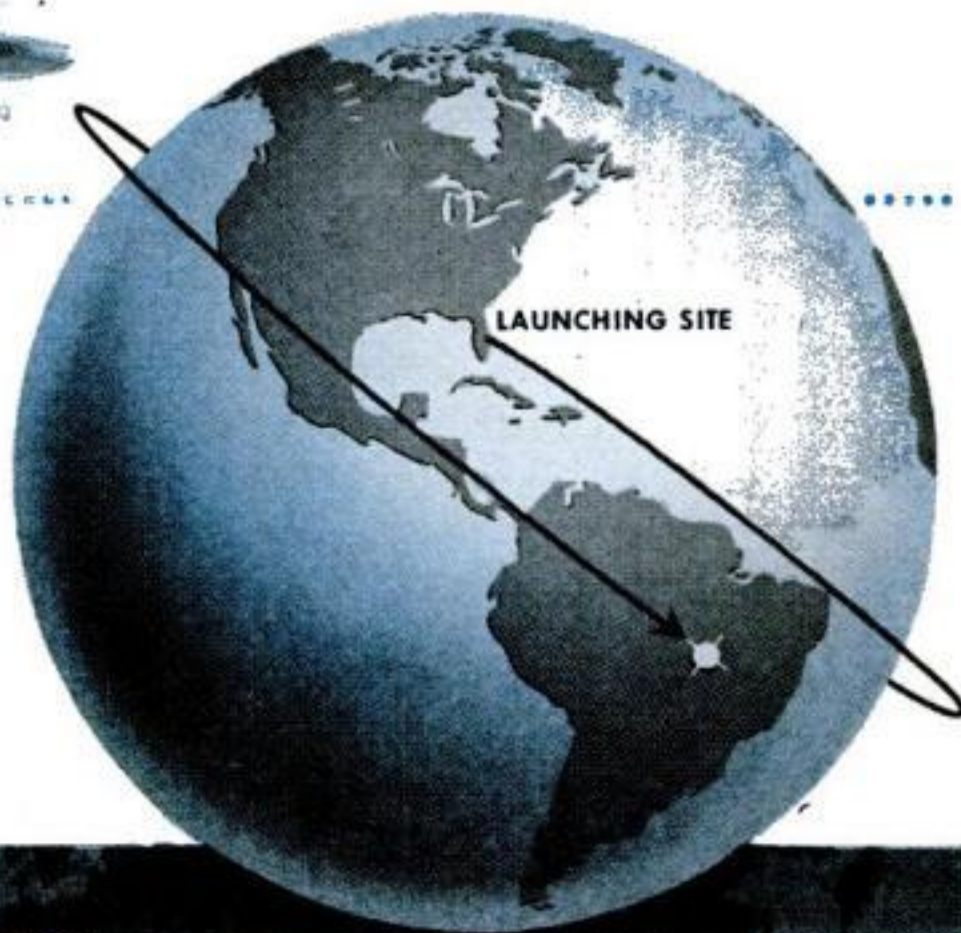




**MOUNT YOUR BINOCULARS** to observe the satellite. Hand-held ones will lose it. A sturdy support like this one that can sweep horizontally and tilt up to 90°, with simple protractor scales to help you locate the fast-moving satellite, is recommended by observatory experts.

## Where in the world the satellite will be seen

**CIRCLING THE EARTH** in 90 minutes, the man-made moons will cross the equator 23 degrees farther to the west on each swing around the earth. First U.S. crossing by a satellite is expected to be over California. It will be visible at various times from within the unshaded area below.





## Why binoculars are best for satellite spotting



**BINOCULARS  
WITH 7° FIELD**



**TELESCOPE  
WITH 3/4° FIELD**

**FIELD OF VISION** is the important thing. The drawing at far left shows the sky area you would see through 7 x 50 binoculars. Magnifying power is not very great: The moon takes up only 1/14 of the field. The artificial satellite, however, would be in view for seven seconds as it crossed the field. Through a telescope (nearer drawing) the moon is much larger, taking up two-thirds of the field. But the satellite would cross the field of vision of this telescope in a mere 3/4 of a second.

will not always see it. And even with their elaborate equipment, they may not be able to predict precisely how the satellite will proceed as it whirls around and around the earth. They will want to know instantly if it starts to slow down or wander from the predicted orbit.

That is why the scientists will welcome the help of amateur observers. In addition to those trained in astronomy, members of the Air Force's Ground Observers' Corps may join the program. Other groups and individuals also will be invited to send in reports on the satellite's progress.

The Smithsonian Astrophysical Observatory at Cambridge, Mass., will be in charge of this mammoth program of optical tracking, and it has appointed Armand N. Spitz, inventor of the Spitz planetarium, as coordinator of visual satellite observations. "Project Moonwatch" has been suggested as a name.

**What will you need** to participate in this brand-new sport? The satellite will be such a tiny thing, traveling so fast, that an amateur's telescope will be of no use to you. "Ordinary telescopes are too powerful for the job and do not have a wide enough field of vision," Dr. J. Allen Hynek, associate director of the satellite-tracking program, explains. "Their function is to magnify a tiny section of the sky, not to pick up a faint, fast-moving object."

Using an ordinary telescope would be about as satisfactory as trying to follow an action-packed football game with an optical eyepiece that would let you see only two feet of the playing field at a time. There is a wide-angle telescope, known as a "rich-field," that will be helpful when the satellite is at its greatest distance (apogee) from the earth. But such a telescope is very expensive and most of the amateur astronomers who use this type have made their own instruments.

**A pair of binoculars** will be the thing to use. They need not be expensive. You can even use monoculars (one-eyed binoculars), which cost less, if you wish. But the experts recommend that you use 7 x 50 binoculars. The "7" indicates the magnifying power, which is low compared to that of a telescope. But what you need is not great magnification, but a wide field of vision. The "50" indicates the diameter in millimeters of the objective, or front, lens. This gives you the light-gathering power that you will need. The Navy, in fact, calls 7 x 50 binoculars "night glasses."

Your chances of making useful observations will be greatly improved if you have your glasses mounted on a sturdy stand, know exactly where you are, and are an experienced observer.

**You can practice now**, even though, as far as we know, there isn't any earth



## What is meant by 7 x 50 binoculars



**MAGNIFYING POWER** is indicated by the first numeral, "7." With one eye to the binoculars and the other eye closed, move toward a tall building so that one story fills the field of vision. Then open the other eye. You should see seven stories with your naked eye.

satellite in sight except our old friend the moon. The man-made satellites will be about as bright, the experts expect, as a fifth- or sixth-magnitude star. A sixth-magnitude star is the faintest that can be seen with the naked eye.

You should begin by learning to find

true north, and familiarizing yourself with star charts\*. If you can find the Big Dipper, you are in business. The two stars at the end of the bowl point toward Polaris, the North Star. Once you

\*A handy chart, called the *Star Explorer*, can be purchased for 50 cents from the Hayden Planetarium, American Museum of Natural History, New York 24, N.Y.

## Practice on the stars until a "moon" is launched

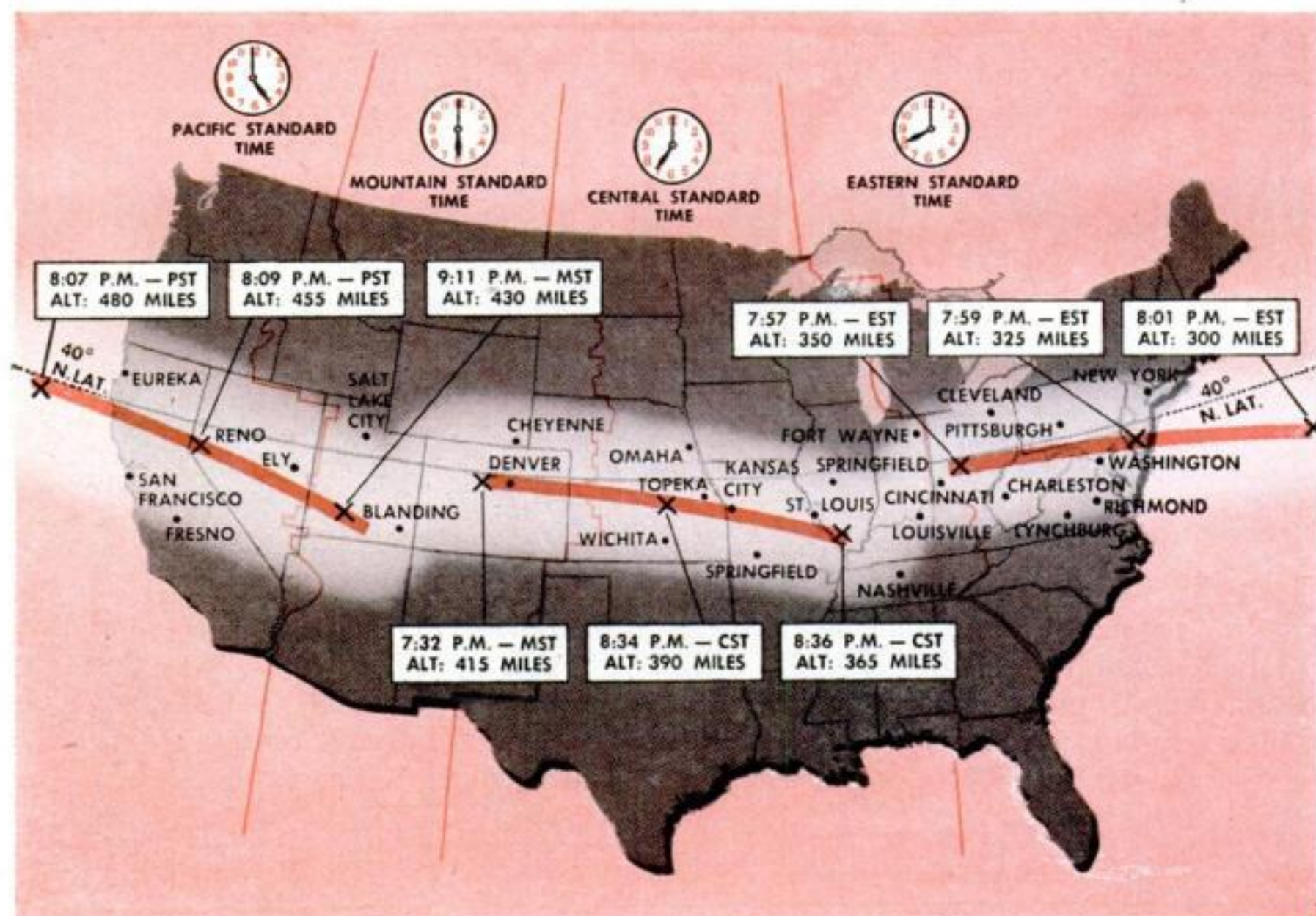
**PORTION OF THE NIGHT SKY** is shown here as it will appear to an observer looking overhead between eight and nine p.m. during the month of May in most of the U.S. Using this chart as

your guide, try to find the North Star in the sky. The Pointers in the Big Dipper will help you to locate it. Then use binoculars and practice picking out fifth-magnitude stars.





## How you will know when and where to look



**SATELLITE ORBIT MAPS**, like the sample above, may be issued daily. Heavy lines show a satellite's path during conditions of visibility. Light, sausage-like portions indicate the areas within

which observers might be able to pick up the baby moon. The map would carry all the information an observer would need to aim his binoculars accurately toward the sky.

have found it, you can find the Little Dipper, because Polaris is the end star in its handle.

The Little Dipper has stars of the second, third, fourth and fifth magnitude in it. The fifth-magnitude star in the Little Dipper is the one at the lower right-hand corner of the bowl.

Practice finding this star. Then get out your star chart and look for other fifth-

magnitude stars. By learning to find them, you'll be training yourself for the fascinating job of finding man-made moons when they whiz by.

**From fixed stars**, you can readily advance to sighting and following moving objects. Airplanes will serve for this purpose.

Go outdoors after sunset or before dawn—the only times that the artificial

### Model of Satellite Can Be Seen in West

A MODEL of an earth satellite, built by Herbert R. Pfister of POPULAR SCIENCE MONTHLY's staff and described in the January issue, is being shown as part of "The American Dream Historical Pageant." This pageant is touring the United States now. During the course of the year, it will be displayed in 50 of the

country's outstanding department stores.

During May, the pageant will be in the western states. It can be seen May 7 at the Daniels & Fisher store in Denver, May 10 at the Z.C.M.I. store in Salt Lake City, May 14 at Bullock's in Los Angeles, May 21 at Macy's in San Francisco, and May 28 at Lipman-Wolfe's in Portland.



satellites will be visible (PSM, Jan. 56, p. 124)—and listen for the sound of an airliner. Then lift your head and try to locate its lights. This may not be easy at first.

Next, try doing it with binoculars. If you do not have a pair, cut the cardboard tube from a paper-towel roll down to 10 inches and hold it up to one eye. That will give you the same field of vision that you would get with a pair of binoculars.

The satellites will never appear as bright as an airliner's lights, of course. Hence, when you are ready to look for satellites, it may be necessary to adapt your eyes to darkness by wearing a pair of deep-red glasses or a strip of red cellophane over your eyes for about a half-hour. The red will remove the part of sunlight that contracts the pupils, and thus enable them to expand and admit more light.

**Other ways to practice** can be devised. You might, for instance, train yourself by launching ordinary toy balloons (if you can get helium to inflate them) and seeing how long you can follow them with binoculars or the cardboard tube.

To be truly helpful to the men whose job it will be to track the satellites, amateurs will have to cooperate with each other. Plans are being made now to organize groups to look for each satellite and then radio or telephone in reports giving its exact position as seen from certain spots at certain times. Ham operators may help the observers to report their findings.

**If 12 amateurs cooperate**, they can cover a 60-degree sweep of the sky, 30 degrees to each side of the predicted course of a satellite. If each of the 12 observers has binoculars with a seven-degree field of vision, and watches an area assigned to him, that area can overlap by one degree the part of the sky that his neighbor is watching. It will be pretty hard for a satellite to sneak by such a team.

"The importance of amateur astronomers in this project can hardly be over-

**NEXT MONTH . . .**

## How to Build a Binocular Stand



A BINOCULAR support designed by POPULAR SCIENCE MONTHLY is inspected in the picture above by Dr. Fred L. Whipple, director of the Smithsonian Astrophysical Observatory, which is in charge of optical tracking of the artificial satellites that will be launched starting early next summer.

Next month PSM will show you how to make this sturdy mount. It will increase your chances of seeing a satellite and helping scientists to track it as it circles the earth.

estimated," says Dr. Fred L. Whipple, director of the Smithsonian Astrophysical Observatory. "The first observations of the satellites after launching, and the last before the satellites spiral to earth, will be of the most importance. A worldwide corps of sky watchers will be needed for this purpose.

"The entire satellite project offers sky watchers an unparalleled opportunity to be of significant service to science." **END**





### Cigarette Lighter Hides Camera

IF YOU don't like being the subject of candid camera shots, beware of this man with a gleam in his eye as he apparently lights his cigarette. He is Wesley H. Fabry of Milwaukee, and there is a camera in the case, its lens so small it can hardly be seen. Fabry has a collection of unusual cameras, old and new.



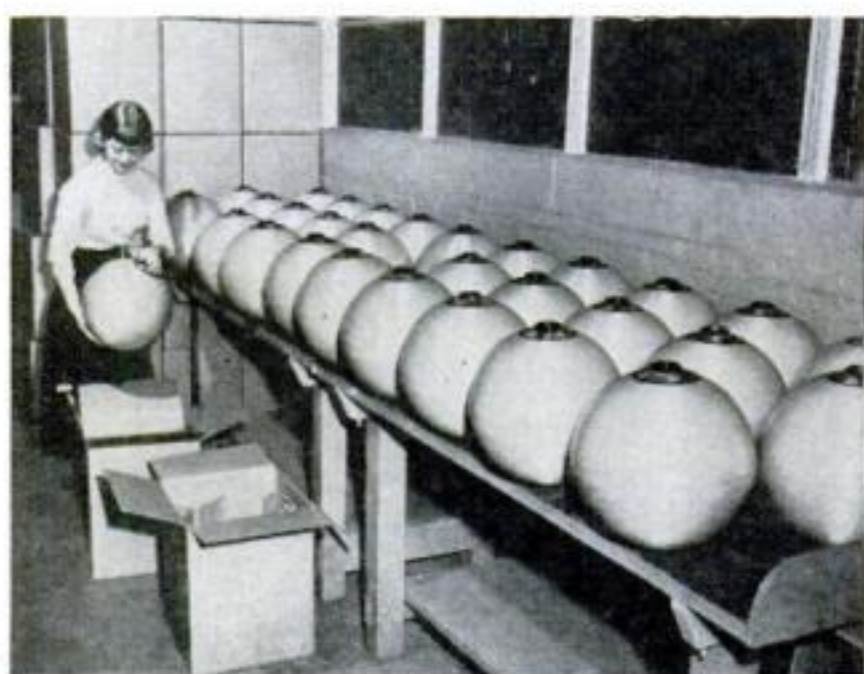
### Aquadolls Take to Water Skis

Toy dolls as well as the live ones go in for water-skiing in Germany. The skis are manufactured by Fritz Steinmetz of Einswarden (Oldenburg), Germany. Priced at one to two dollars, they come in sizes to float dolls of various weights. The toy tot above is skimming over the water after sliding down a ramp.



### Parking-Lot Stubs Go Automatic

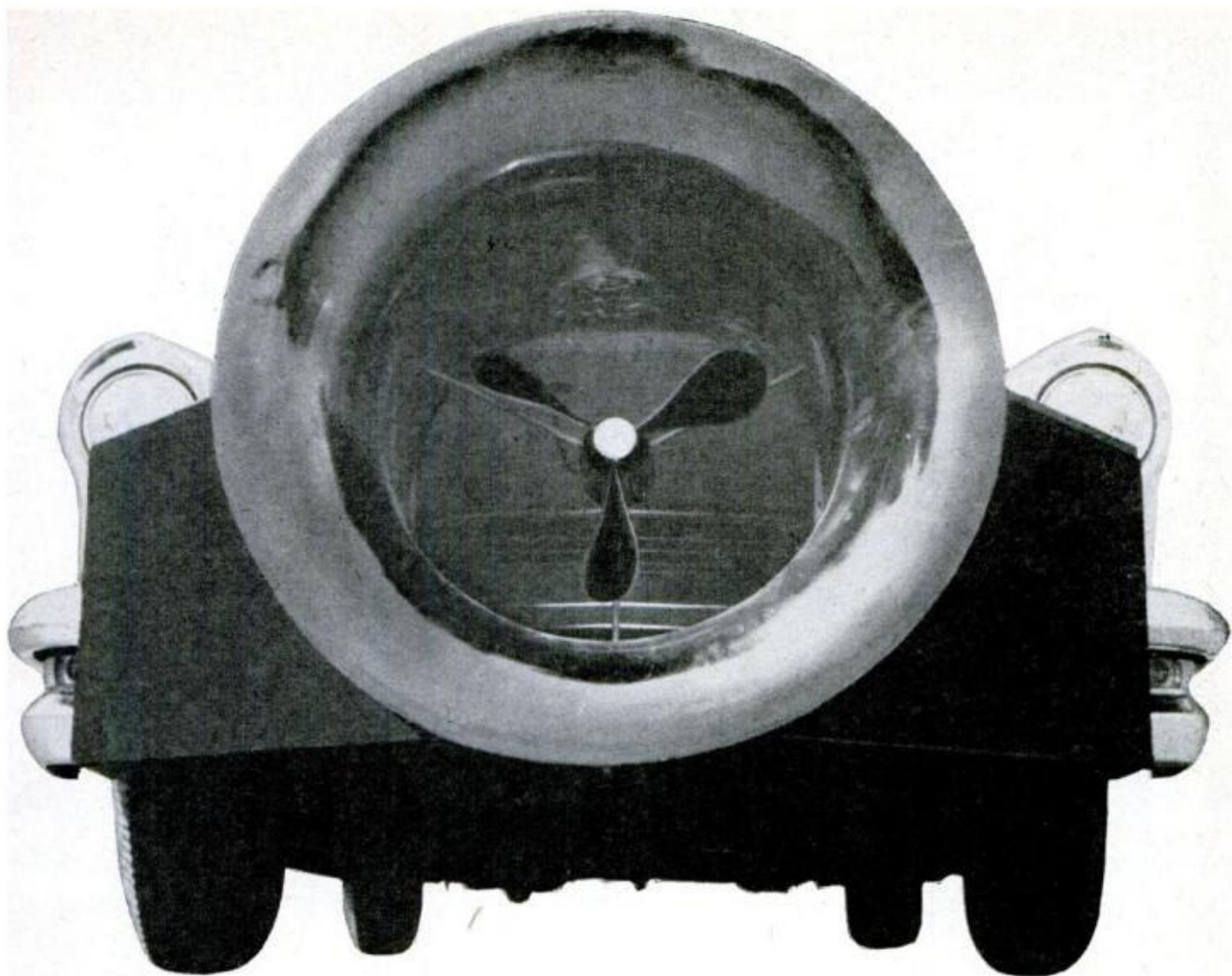
A "ticket spitter" time-stamps identification cards for motorists entering this Detroit municipal parking lot. Activated by a treadle over which the cars must roll, it cuts down on the attendant's work. He is there, on the left, to collect your fee as you leave.



### Glass Spheres Help Run Planes

THESE fiber-glass spheres, shown being packed for shipment, hold compressed air and gases for operating aircraft equipment. They replace steel containers, save 40 percent in weight. Walter Kidde & Co., Belleville, N.J., makes them in sizes of 50- to 5,000-cubic-inch volume.





## **“Snorkel” on Test Car Swallows Air in Giant Gulps**

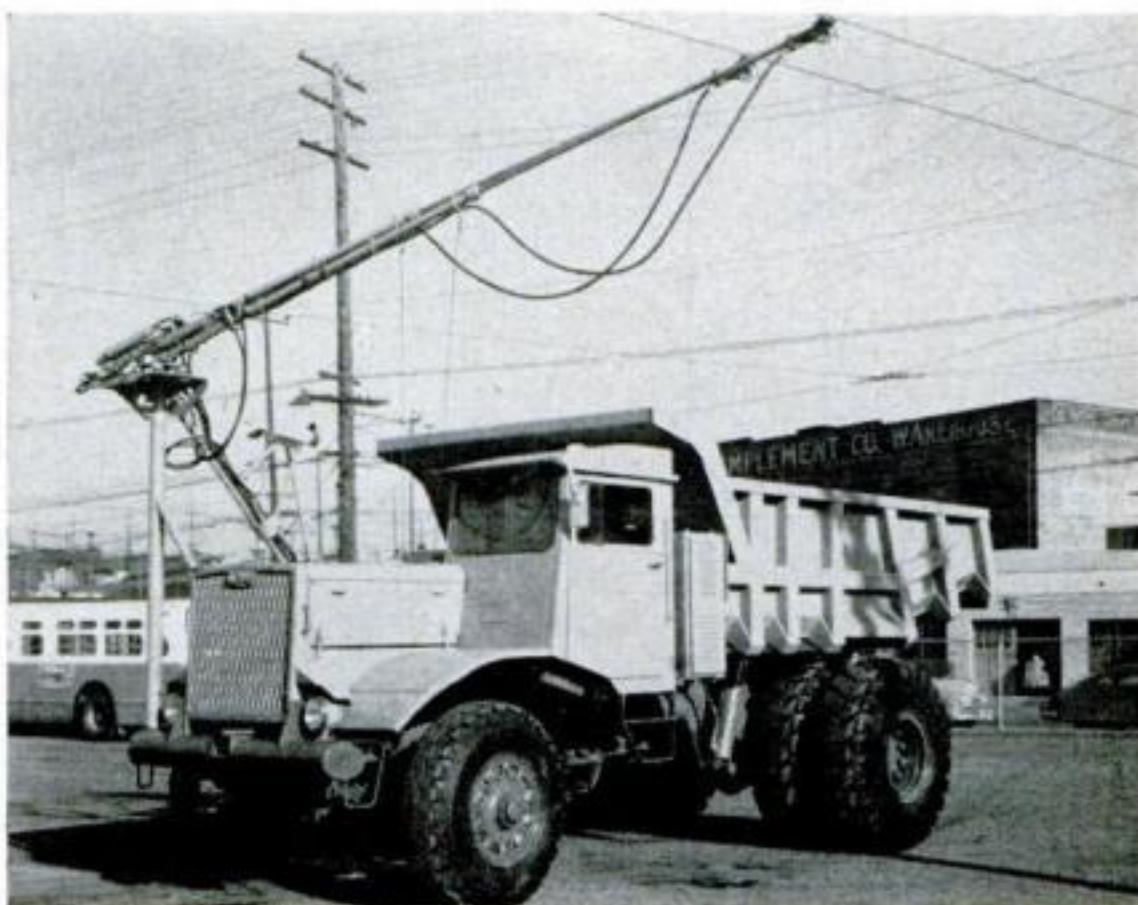
THIS huge-snouted vehicle is not a “car of tomorrow.” It’s a Ford test car, designed to measure radiator air flow in road-cooling and fan-power tests at the Dearborn proving grounds. The fun-

nel-shaped mouth contains a propeller-type anemometer, which turns with incoming air. By the number of revolutions it makes, engineers can compute how much air has passed through.

## **Rock-Hauling Truck Powered by Trolley**

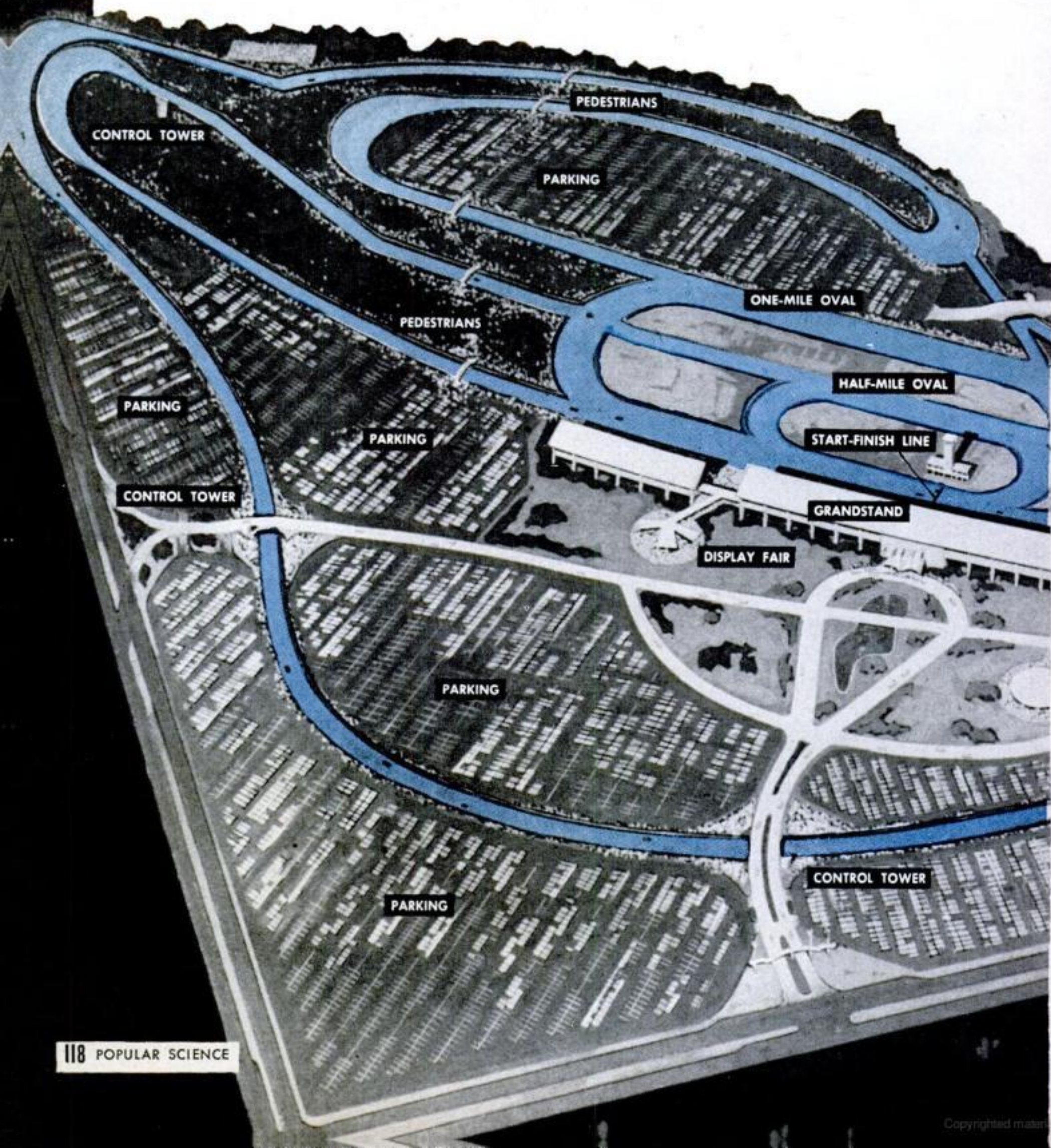
SAID to be the first U.S.-built electrically operated truck of its kind, this 24-ton vehicle hauls limestone underground from a mine to a crusher on the surface.

Current for its 550-volt GE traction motors is collected from overhead wires by trolleys on poles. The truck, designed by Kenworth Motor Truck Co., Seattle, also has cable reels for getting power in areas without overhead wires.





# 6 Race Tracks Planned in 470-Acre Speedway





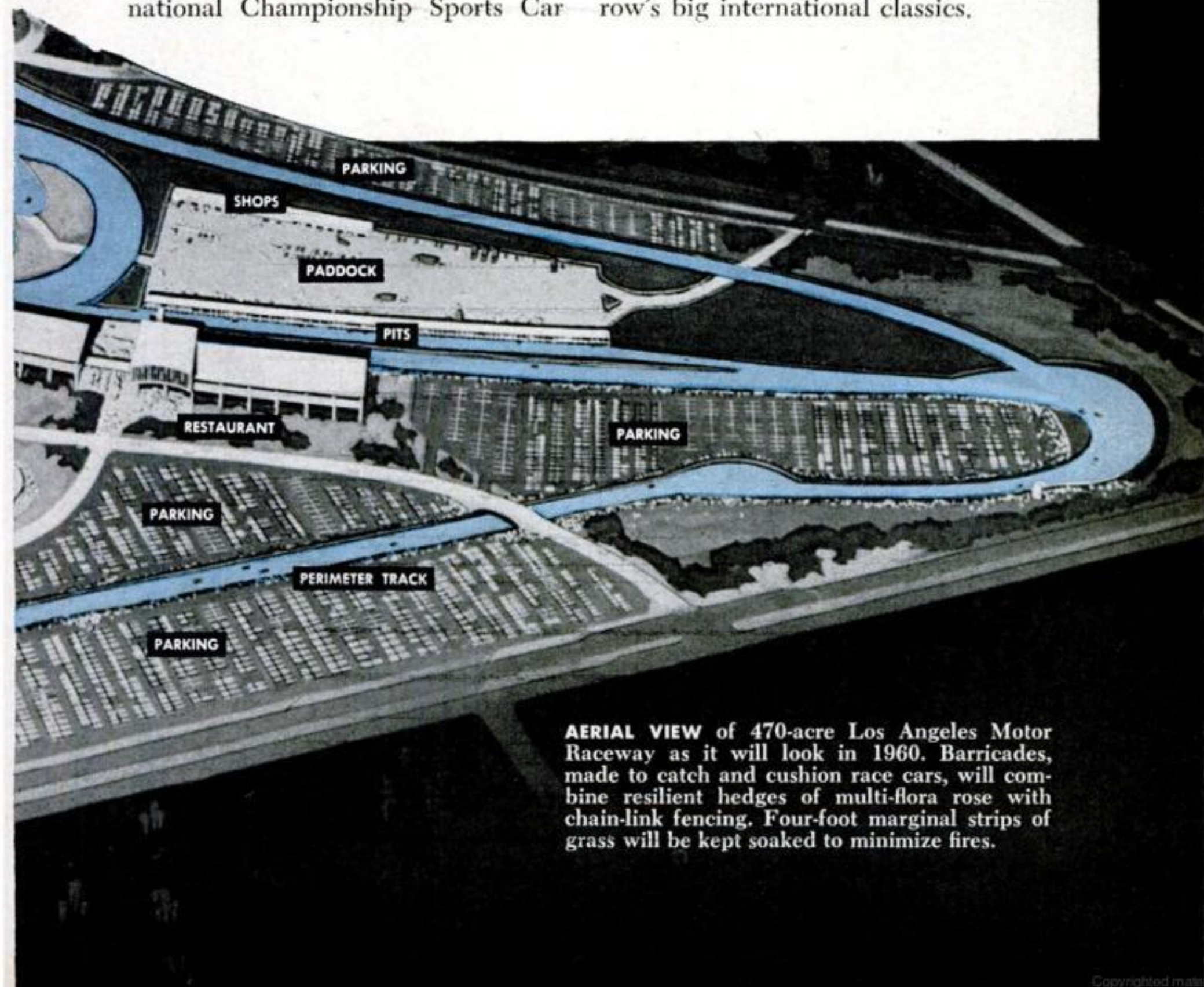
A 12-million-dollar bid to make Southern California the motor-car-racing Mecca of the world is just beginning to shape up on 470 acres of flatland 32 miles east of Los Angeles.

The ambitious project, to be called the Los Angeles International Motor Raceway, will offer track-racing and test facilities unmatched anywhere, its designers claim, when it goes into service this summer.

The giant speed and endurance emporium will have six asphalt-paved, flat circuits, each laid out for a special type of race. Two of these circuits will be suitable for such classics as the International Championship Grand Prix and the International Championship Sports Car

Race. Two other circuits will offer oval tracks for stock cars, midgets, sprint cars and Indianapolis-type racing cars. A fifth will be a perimeter-skirting road for speed-endurance testing by auto manufacturers. The sixth will be a drag strip for quarter-mile acceleration runs.

Paved parking lots for 22,000 cars and a 20,000-seat grandstand are scheduled to be completed in time for the Raceway's opening this year. A permanent concrete structure, to replace the temporary stands, will be ready by 1960, along with an ultramodern race-car pit and shop facilities. There will even be a training school where promising young drivers can be groomed for tomorrow's big international classics.



**AERIAL VIEW** of 470-acre Los Angeles Motor Raceway as it will look in 1960. Barricades, made to catch and cushion race cars, will combine resilient hedges of multi-flora rose with chain-link fencing. Four-foot marginal strips of grass will be kept soaked to minimize fires.



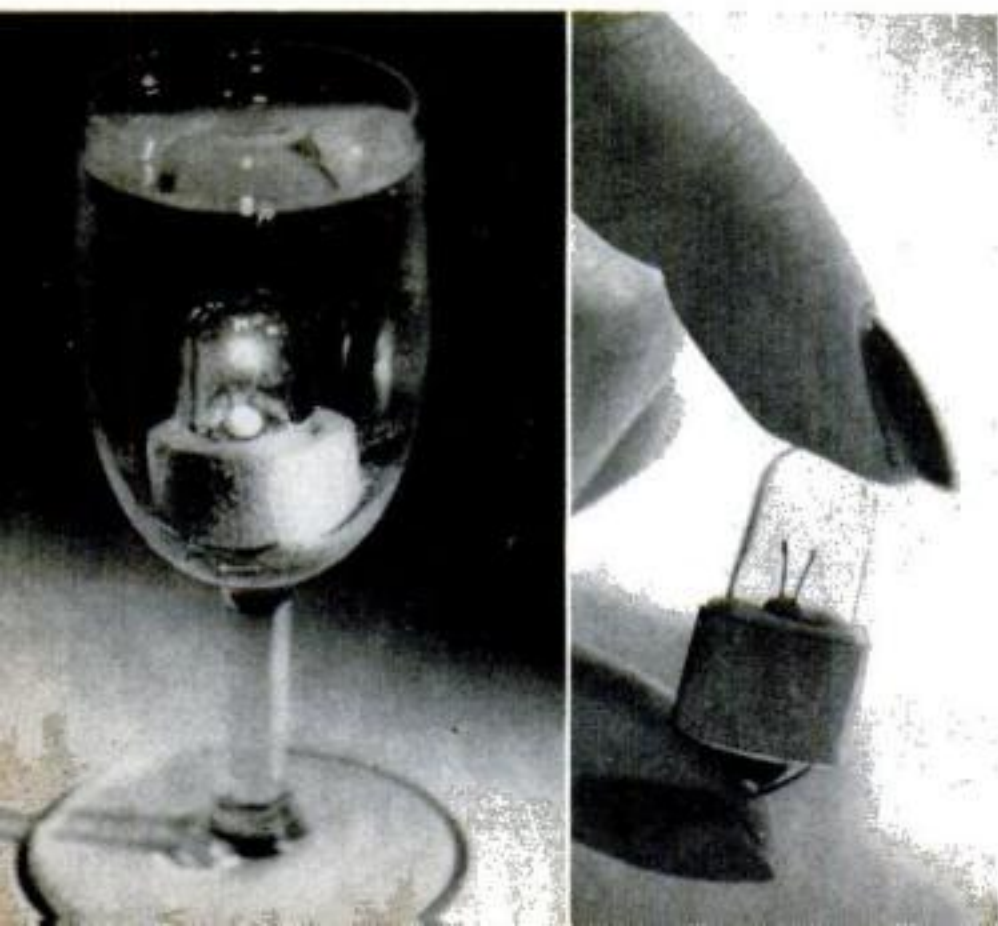


## Hydraulically Operated Bucket Gives Dredger a New Look

GONE from this German-designed dredger are the familiar steel cables for lifting and lowering the scoop. They have

been replaced by a hydraulic system. Other features of the new Demag model include a one-third reduction in weight.

## New Battery Makes a Small Bulb Shine in a Glass of Water



WATER is the electrolyte for the little battery on the base of the small bulb at left. Dunked in a glass, the bulb lights quickly, glows for an hour.

Developed in the Naval Ordnance Department of General Electric, the battery may be stored dry without loss of power. Utilizing an exterior electrolyte and lightweight glass beads to separate the smaller silver-chloride cathode plates and magnesium anode makes possible more output and better voltage regulation than in a conventional battery of the same size.



# Skin Divers Seek Key to Buried Oil Treasures

*Underwater scientists mix work and adventure in quest of tips on where to drill.*

**By Ernst Behrendt**

**D**ON your flippers, strap a diving lung to your back, jump overboard and swim right down to the bottom of the Gulf of Mexico—20, 30, even 60 feet below. Through your goggles you see a flat round object. Don't pick it up yet. Take a picture first—there's enough light for your water-tight camera. Take notes—you have a wax pencil with you, and there's a plastic slate strapped to your thigh. Now you may grab the thing and put it in the gunny sack you have with you.

It's only a sand dollar—a common type of sea urchin—but one day this sand dollar may be more valuable than rotting treasure chests bursting with Spanish doubloons. It may

◀ **IN A CLOUD OF BUBBLES**, a geology technician heads for surface with a gunny sack full of marine-life specimens that may be clues to oil.

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be the key to an undersea fortune in oil.

**To play this game** you have to be an expert frogman and an expert geologist. A handful of men who are both are employed by oil companies. Dr. R.N. Ginsburg and R.M. Lloyd of Shell first took a skin-diving course at the University of Miami before sampling coral reefs off the Florida keys. Dr. Henry Nelson and five others working for Socony-Mobil had their lessons in a Dallas swimming pool and in the San Marcos River; then they ventured out in a shrimp boat to survey the ocean bottom 45 miles south of Texas. Off the California coast Dr. Robert S. Dietz and five partners are diving for other oil-company clients.

There is no telling where you will bump into skin-diving scientists this year. Don't worry: Invading your undersea haunts, they will leave the game fish for you to shoot or spear. Instead they will stir up mud, scoop up sand, shells and starfish, break off chunks of coral, and attack stubborn specimens with a geologist's pick and a suburbanite's dandelion digger. Photographed, described and labeled, the specimens are sent in metal cans to laboratories for further analysis.

This is why coral, mud or starfish may point the way to fabulous new oil fields:

**STRUGGLING** under conditions comparable to the zero gravity that space travelers will experience,



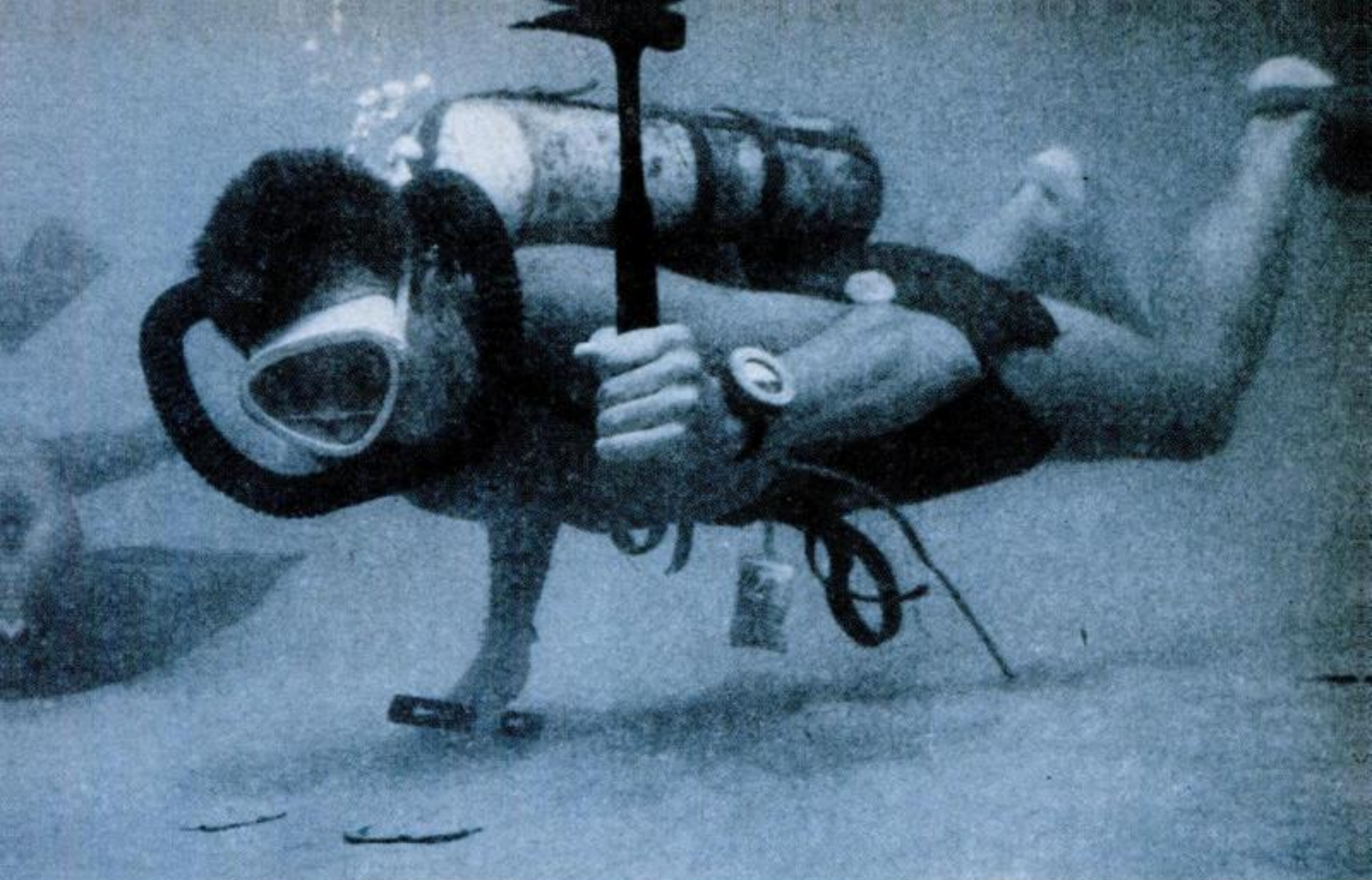
While a skin-diving teammate holds the bag,

**You find oil in two kinds** of porous formations in which it was trapped millions of years ago. One kind is fairly easy to discover—for geologists, that is—because the rock layers above the oil are

submarine oil prospectors work loose a piece of coral for their oil-tracing collection.







a scientific beachcomber probes with a geologist's pick for sand dollars on the Gulf floor.

tilted or broken. But in the second type, called "stratigraphic traps," the rock layers are undisturbed. Geologists know almost no clues by which to find them. So far, these traps have almost always

been found only by accident; among them were some of the richest oil fields—the famous East Texas field, for example—in the U.S.A.

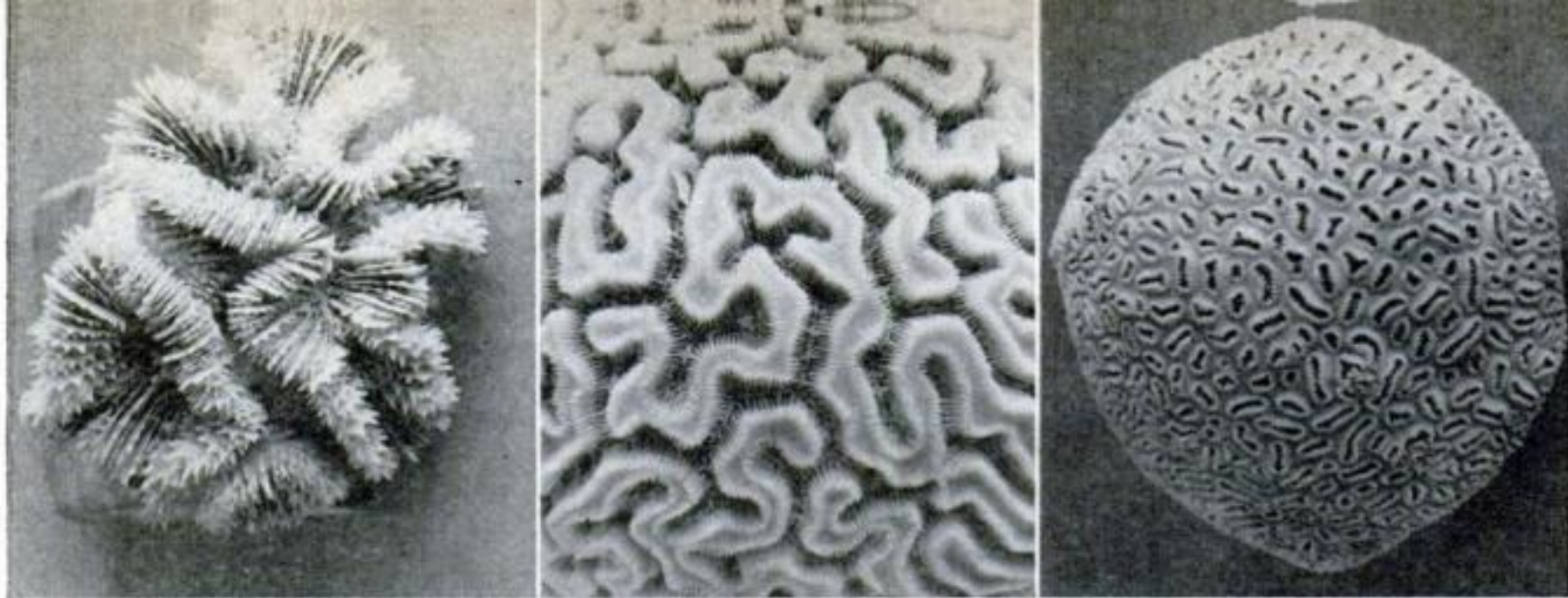
Today, skin-diving scientists believe

**WATERTIGHT CAMERA** is used to take a close-up of a marine animal in its native environment.

**A FINE SPECIMEN** of staghorn coral is handed up by diver to his companion waiting in boat.







**THREE TYPES OF CORAL** that skin-diving scientists have brought back from the ocean bottom. Left to right: flower coral, brain coral, star coral.

Later other geologists will try to match these specimens with fossils found in ancient rock formations that they think may overlie oil.

that they can literally come up with the tip-off clues they need. In stratigraphic traps, oil is found in formations that millions of years ago were coral reefs and sand bars. We have coral reefs and sand bars today, too. The diving scientists can study the places where coral likes to grow; and the places where sand bars form; and the mussels, sponges, sea urchins and other things that always live near coral reefs and sand bars.

**Oil prospectors**, drilling on land or at sea, can then search for the fossilized remains of the ancestors of those sea ani-

mals. These will serve as clues to the location of ancient reefs and bars under which the prospectors are most likely to find oil.

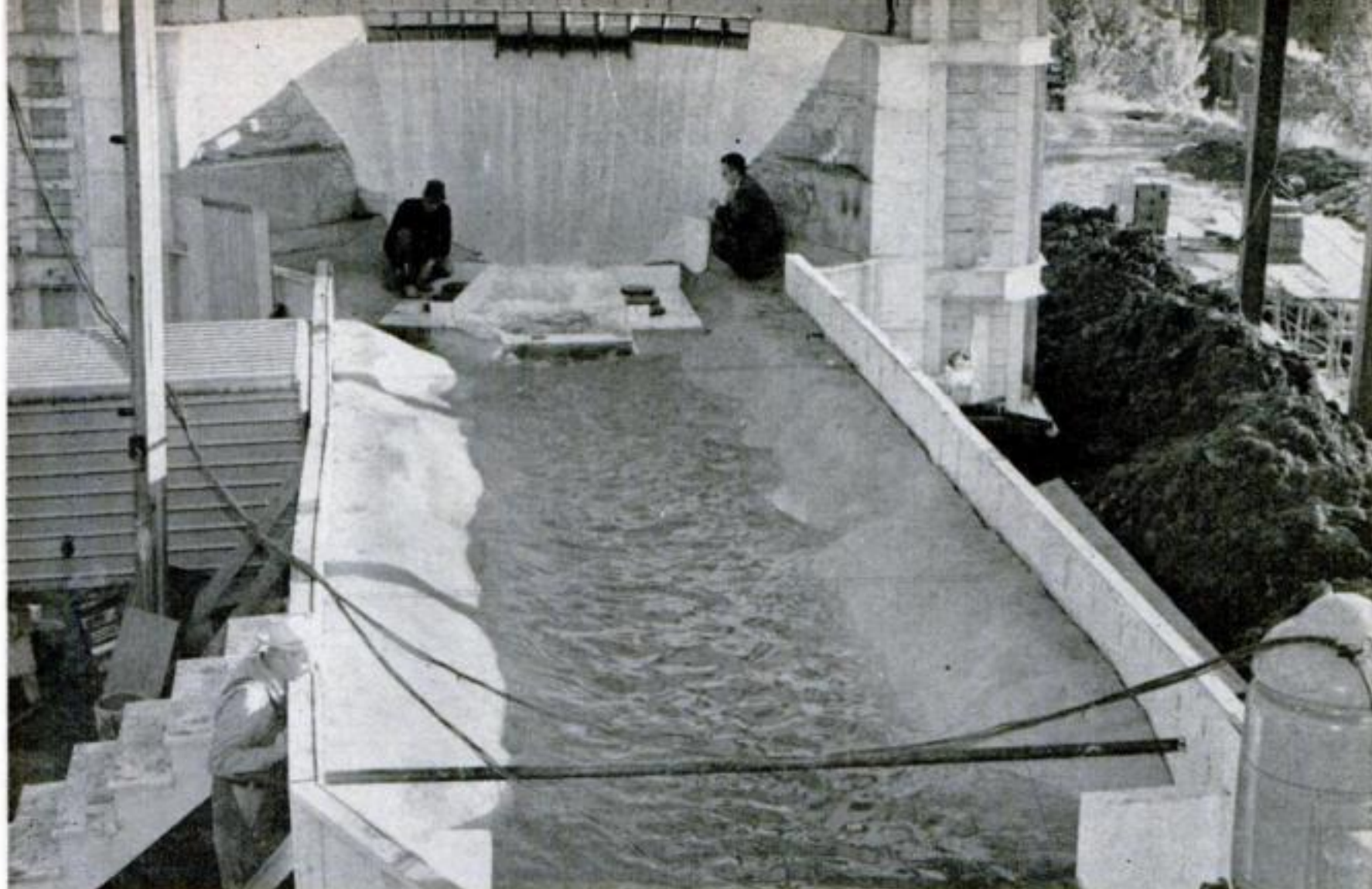
The skin-diving scientists work for 30 minutes at a time—less when they see a barracuda. Twenty feet down, the water is so clear that they are afraid of sunburn; and at least two nearsighted scientists are happy because the underwater refraction of light helps them see better. Here, in the Silent World, a shell, a sea urchin or a coral branch may point the way to untold riches.



**PROSPECTING ON LAND**, geologists uncover the impression of a marine fossil in sedimentary

rock millions of years old. Type of fossil may indicate chances of striking oil below. **END**





### **Model Waves Lap at Model Dam to Try It Out Before It's Built**

BUILDING a working model first is the modern approach to dam design and construction. Here engineers study wave action at powerhouses, water elevations and

other hydraulic problems on a 64-foot model of a proposed dam on the Snake River in Idaho. It was built on a 1-to-50 scale at Washington State College.

### **Electronics Traces Car Faults**

ONE of these electronic instruments, clipped to a car's ignition system, tells on the screen what is wrong with the old buggy. The heart of the device is a cathode-ray tube like that in your TV set. Allen B. Du Mont Laboratories, Clifton, N. J., developed it as a quick analyzer of many auto-engine troubles.



### **Heat-Ray Camera Photographs Objects in Total Darkness**



HERE is an infrared photo of a girl holding a glass of ice water. Shooting in the dark, the Evaporograph (Eva for short), at far left, records heat variations in different colors on an oil-coated film.

Made by Baird Associates of Cambridge, Mass., the device provides a direct view or a photograph.



# Rubber Airplane

**I**N AKRON, OHIO, home of the rubber tire, a guy is flying on a mattress these days. It's a rubber mattress, of course. He just inflates it, puts an engine

on, hooks up the controls, and takes off.

Goodyear Aircraft decided to find out what could be done with an inflatable airplane. So it made an experimental,



**1 TO FLY ON A MATTRESS**, you first unload the thing, deflated, from your station wagon. Wing weighs about 300 pounds. The engine, a 40-horsepower, two-cycle job, has already been unloaded.

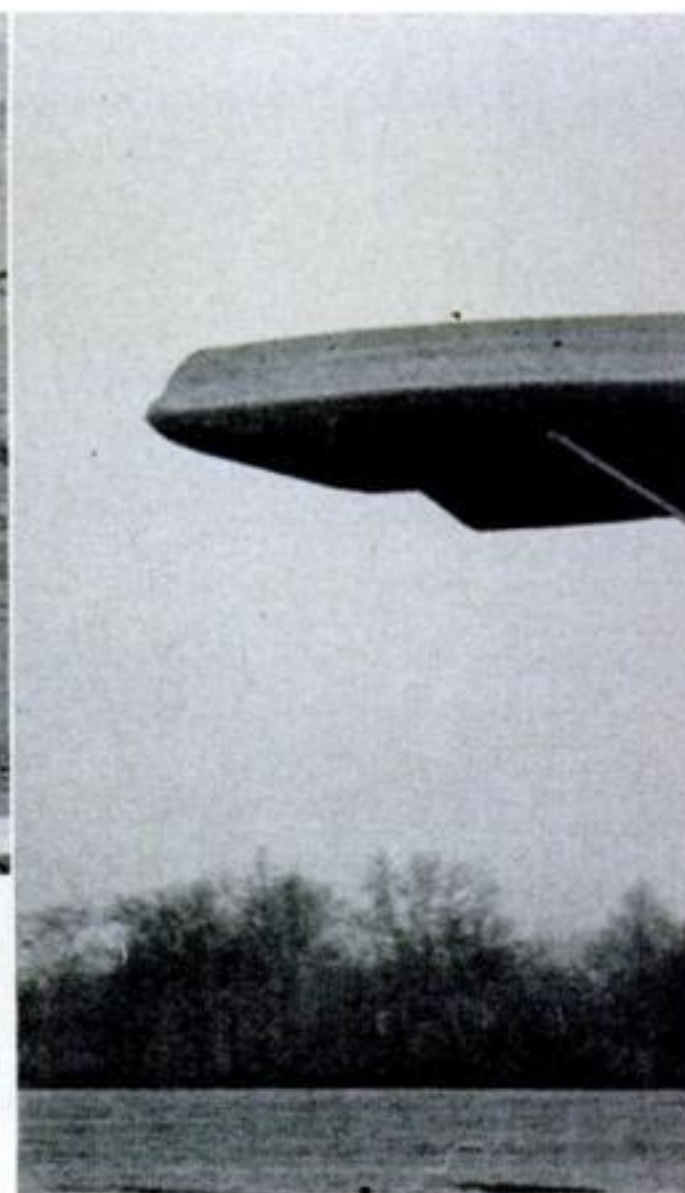


**2 UNFOLD WING AND FUSELAGE**, lay them out flat on the ground. Stick and foot



**4 ATTACH THE ENGINE**. Its tubular support sits above fuselage behind wing. Wing struts are steel. Only other metal parts connect the wheels and pilot's seat with the fuselage.

**5 AND FLY**. Inflatable airplane requires run of about 200 yards, reaches a speed of 60 miles an hour. Pilot Dick Ulm, at controls, says it handles just about like any other lightplane.





# Flies 60 M.P.H.

puffy one-seater. The wing and tail are layers of rubber-impregnated nylon fabric called Airmat. The layers are connected with nylon threads of fixed length.

As a result, the fabric holds to the intended shape when inflated.

The conical fuselage is airship fabric, like a blimp's.—*Joseph Dorlaque.*



controls, resembling those on a regular lightplane, are hooked up at this point.



**3 PUMP IT UP.** This is simplicity itself. Goodyear says that a tank-type vacuum cleaner—with hose reversed—will do the job. Mattress airplane carries less air pressure than an automobile tire.







## Phone Goes Jingle Instead of Jangle

PEOPLE in and around Crystal Lake, Ill., are being called to the phone this spring with musical notes.

If they like it, and the transistorized device stands up in this field test, you may have the equipment soon in your own phone. It replaces the bell in a new grilled phone base.



## Rescue Tractor Hauls Crippled Plane Across Arctic Icecap

WHEN an Air Force C-47 made a forced landing on the wind-swept icecap of north Greenland, the crew was ready to abandon it. A rescue group from Thule

Air Base had other ideas. A snow tractor was sent into the frozen waste, special sled rigs were put on the plane, and it was towed 87 miles to the base.



## Anti-Smog Muffler Burns Up Exhaust

A NEW muffler having a spark plug to fire unburned exhaust gases will be required equipment by 1958 on gasoline-powered buses and trucks in Los Angeles.

It removes 97 percent of hydrocarbon emissions, which help formation of smog.





## **“Most Automatic” Ship Rides Erect with Anti-Roll Fins**

Two underwater fins mounted amidships cancel out 90 percent of this ship's roll in heavy seas. A gyro unit senses the start of a roll and counters it by changing the fin angles. The *Wanderer*, a Sperry

Gyroscope Co. floating laboratory, also has nine different steering methods (four automatic), three compass systems, two types of radar and a Loran receiver for electronic position finding.



## **Electronic Traffic Camera Snaps License Tag, Computes Speed**

A TRAFFIC cop with a photographic eye, the automatic camera in the trunk of the car at far left registered complete data on speeders in a test at Garden City, N. Y. At right is its photographic evi-

dence: license plate, location, date and speed in thousandths of a second. Only vehicles breaking the speed limit trip its electronic shutter. Synchronized flash makes it workable night and day.





First passengers on demonstration runs, local youngsters liked huge windows at car ends.

# Gasoline Monorail Delights Houston

**A** RAILROAD car that has its wheels on top is giving residents of Houston, Tex., a taste of what tomorrow's commuting could be like.

It's an exciting taste, for the topsy-turvy car is a full-size, fully operating monorail coach. Half again as big as an intercity bus, the blue-and-silver sky trolley skims along an overhead rail five city blocks long, offering free demonstration rides to all.

Four electrically controlled doors close noiselessly each time 60 guests climb into the spaceship-like passenger compartment for a smooth glide up and down the right of way. Two pretty hostesses make sure that everyone is comfortable. Some riders lounge in saddle-contoured plastic seats that are placed diagonally along the car sides to give maximum knee room. Others recline on deep-upholstered car-end settees.

*A buzzer gives the highball* to the monorail operator. Seated in a separate cab six feet above the car roof, he looks down through a Plexiglas blister at the roadway ahead: a 970-foot stretch of 30-inch-diameter steel pipe, supported by 18 offset columns made of similar pipe sections. His cab, along with the two 305-horsepower gasoline engines that drive the coach, a two-speeds-in-either-direction hydraulic transmission, and eight rubber-tired driving wheels, all override the heavy pipe rail. The passenger coach is connected to this combination control-and-power truck by a pair of massive arms that arc around the



**TASTE OF TOMORROW'S RAPID TRANSIT** for young Texans included comfortable plastic seats set on a bias to give passengers more knee room.

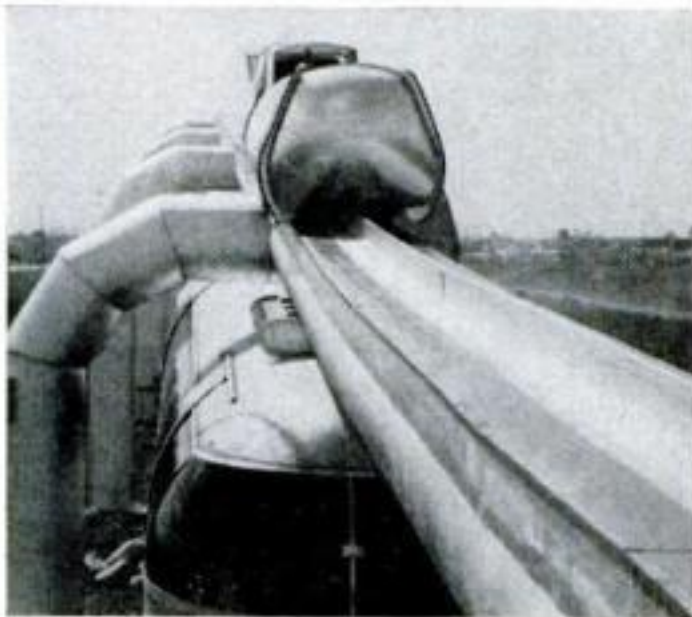




Spectators were intrigued by coach's operating cab, housed in long, overhead power truck.

**19,000-POUND WEIGHT** of coach is carried easily by 30-inch-diameter pipe structure whose columns are sunk 16 feet in reinforced concrete.

**INVERTED "T" RUNWAY,** welded atop the horizontal pipe, is track for eight rubber-tired wheels. Smaller wheels take side thrusts.



free side of the running rail and hold the coach roof just below the rail.

Naturally, a rail structure that's less than a thousand feet long gives the sky trolley no chance to whip up to the 100-m.p.h. speed claimed for it by its Houston builder, Monorail, Inc.

*As the car climbs* the short upgrade that takes it from boarding height to a leveling-out point 30 feet above the ground, however, passengers get a smooth, airborne sensation. With power

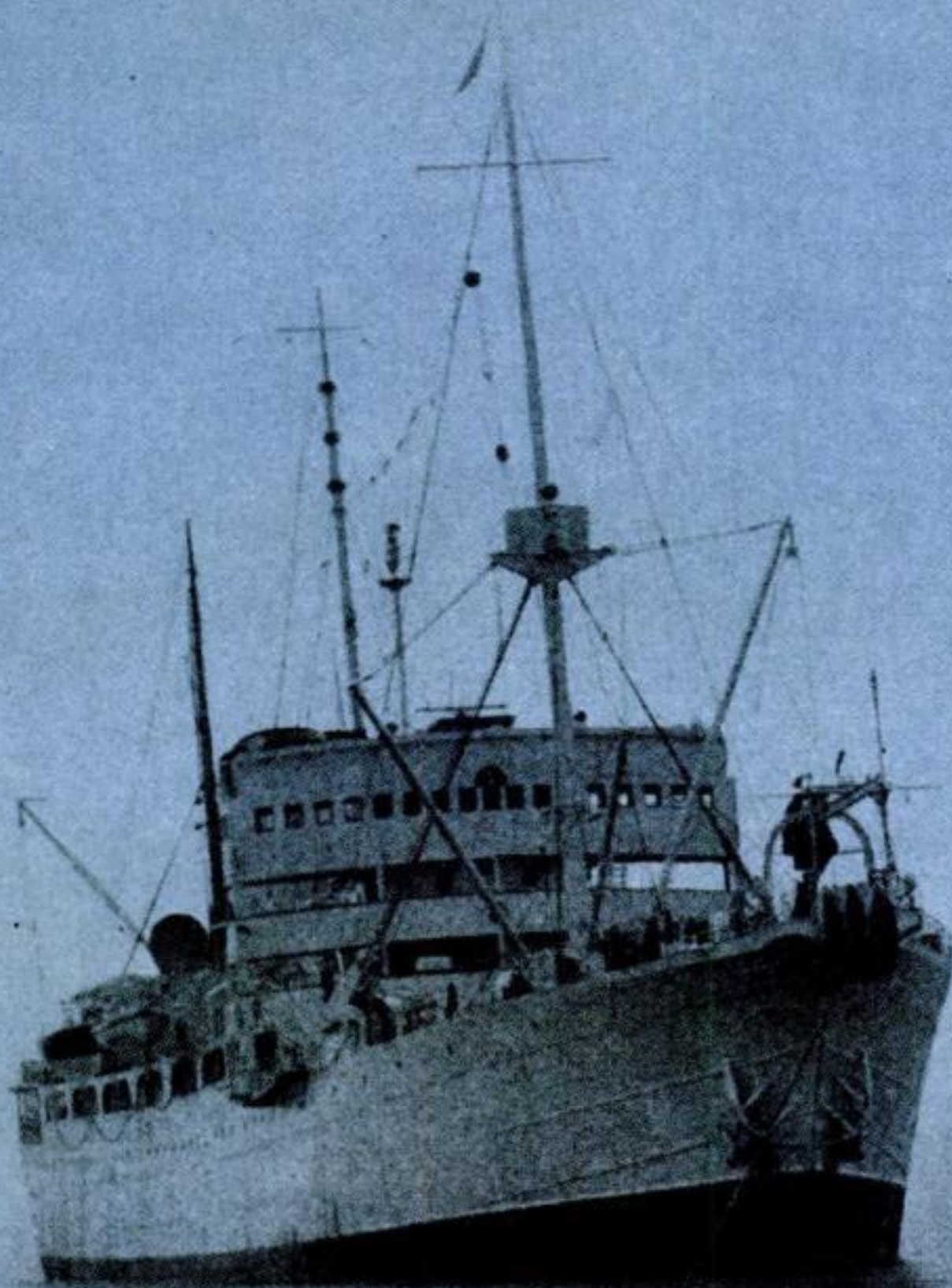
housed in an independent truck, the coach interior is almost as quiet as an elevator.

Given a nod from Houston's town fathers or those of any other interested city, Monorail, Inc., says it is ready to build a "Skyway," based on this pilot model, anywhere. Complete from rail structure to coaches capable, the sponsors say, of 200-m.p.h. speeds—it would be offered to a rapid-transit company on a long-term lease-purchase plan. **END**



# How They've Laid Wires to Europe

***Thirty years of planning and \$40,000,000 spin out a new wonder: the first telephone cable to span the Atlantic.***



In morning mist off Newfoundland, the Monarch starts the first transatlantic phone cable.



**By Frank J. Taylor**

ONE day next fall, a tenacious American Telephone & Telegraph executive, William Glasgow Thompson, will pick up the phone in his New York office and call London. In as little time as it takes to ring his suburban home, he will have his party in the British Isles via a newly completed transatlantic telephone cable, which rates as one of today's outstanding electronic and engineering achievements.

For the Bell System, this 2,500-mile cable is the realization of a 30-year dream: Thompson, A.T. & T.'s "Mr. Overseas," started working on it in 1928. For telephone users, it means sure-fire transatlantic connections *any time*, regardless of magnetic disturbances or storms.

The cable—really twin cables, one east-

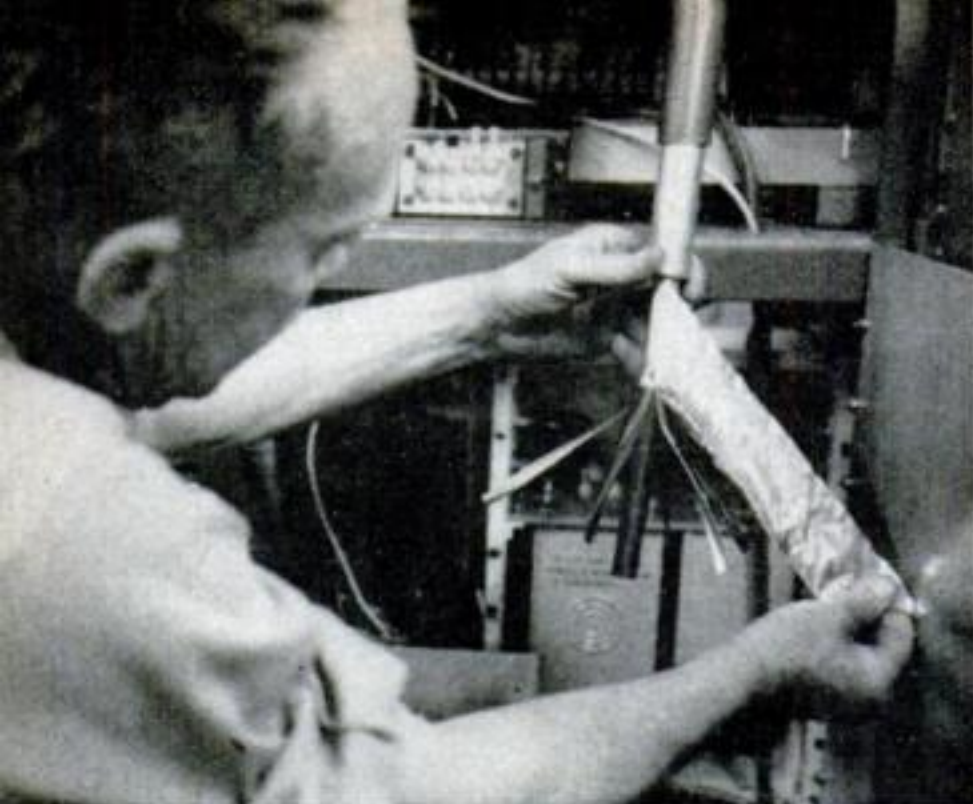


**THE CABLE COMES ASHORE** at the Newfoundland fishing village of Clarenville, the American terminal. The short "tip" shown above is later spliced to the long lengths aboard the ship.

Unbroken miles of cable are painstakingly coiled by hand inside the Monarch's huge tanks.

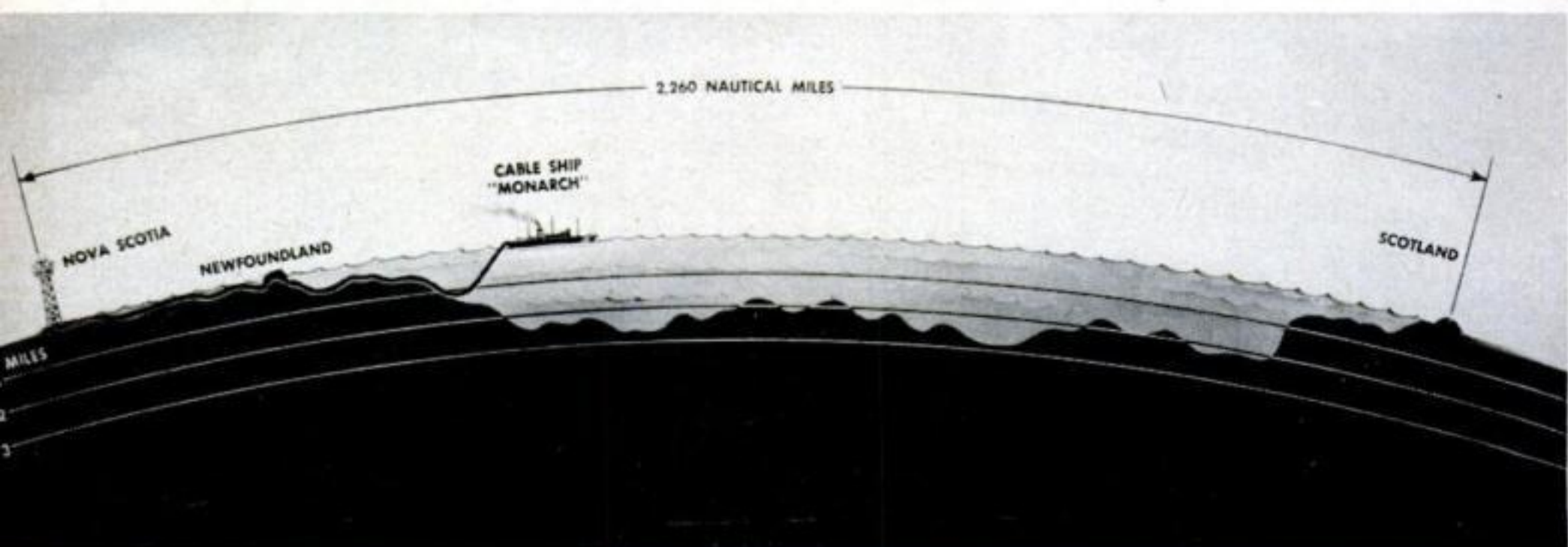






**AMERICAN END** is connected to power equipment in the terminal building at Clarendville. From here your voice travels to Scotland.

**"WHEEL OF FORTUNE"**—huge cable sheave aboard *Monarch*—adds fun to an excitingly serious voyage as men bet on stopping point.



**THE LOW ROAD TO SCOTLAND** serves Canada and the States. U. S. circuits use microwave radio relay to Nova Scotia, which is connected

by short submarine cable to the Newfoundland terminal of the transatlantic cable. Eastbound line is in; westbound line will be laid this year.

bound and one westbound—cost 40 million dollars and is expected to handle 1,200 conversations a day. It can carry 36 conversations simultaneously. It is such a precise piece of construction that communications engineers speak of it almost with awe.

**Woven into it** at 40-mile intervals are 102 Lilliputian booster stations, known as repeaters, each capable of amplifying telephonic voices a million-fold to compensate for loss of volume in transit. At the heart of each of these repeaters are three marvelous electronic tubes which were perfected in the Bell Laboratories and are rugged enough to withstand constant use for at least 20 years.

In 1929, A.T. & T. discussed plans for laying a cable with the British Post Office, which operates the telephone

system in Britain. Because of the depression and other problems, that cable was never laid. Thompson is now glad that it wasn't. For the 1929 cable was designed to carry but one conversation at a time, would have handled about 40 calls a day—as compared with the 1,200 of the new cable.

In 1927, overseas talk took to the air via radiophone. Business zoomed during the next quarter-century. But radiophone alone wasn't enough. There were too few frequencies in the radio spectrum to handle the anticipated traffic. Moreover, during bad magnetic years, circuits sometimes failed to function, or heavy static made conversation extremely difficult.

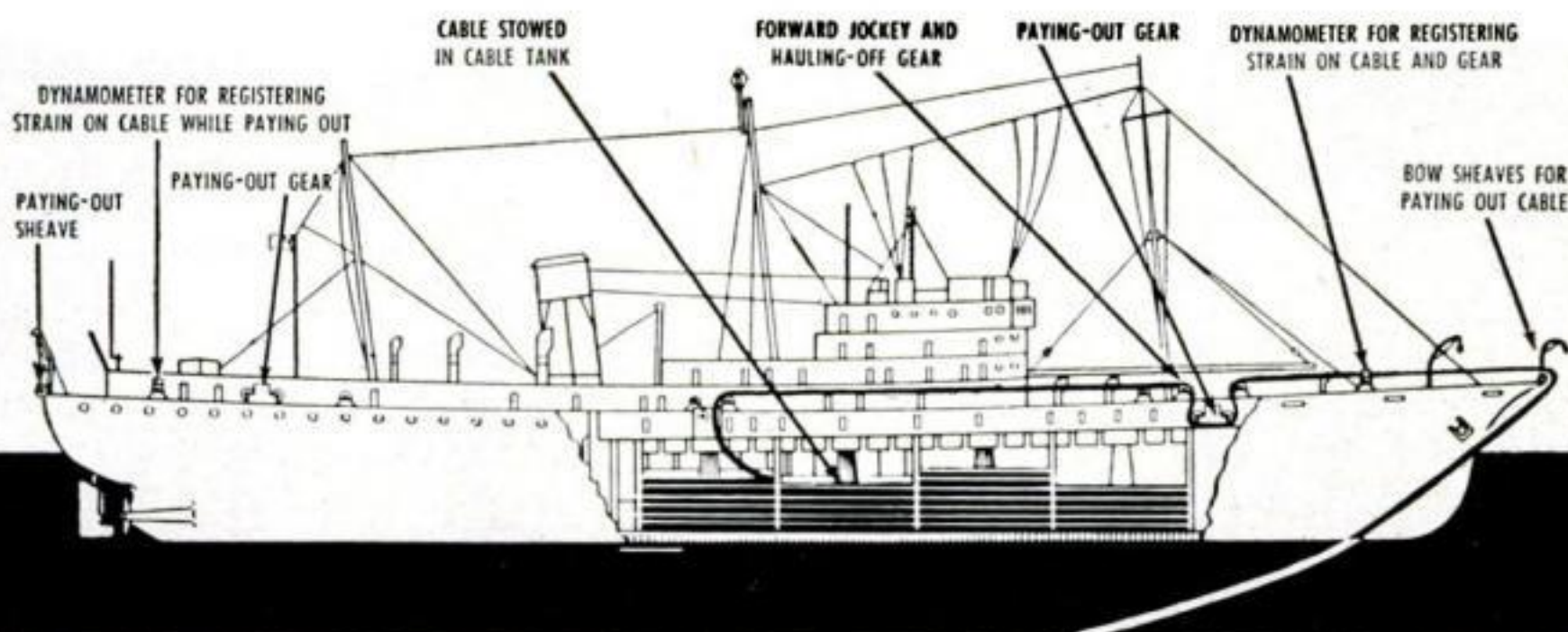
So Bell engineers never gave up working to improve their cable and develop





**HEADING EAST TO SCOTLAND**, the *Monarch* pays cable off her stern into the deep Atlantic. The heavier cable that is laid into shallow

waters near land is lowered off the bow of the ship. The segments—two shallow, one deep—are laid separately, their ends marked by buoys.



**WORLD'S BIGGEST CABLE SHIP**, HMTS *Monarch*, is the only vessel capable of the transatlantic job. Besides her four cable tanks—a single one

holds as much as 440 miles of cable—she carries a complete laboratory equipped with delicate gear for testing cable as it is laid.

boosters that would “push” the voices along it. In the mid-30’s they perfected the long-life electronic tube that is now the cable’s heartbeat. Tubes built in 1935 have been kept under power ever since, without failure.

**Their next big problem** was to fit the tubes and some 60 other components of each booster inside a flexible housing without creating more than a slight bulge in the cable, so that it wouldn’t jam as it was payed out over the drums of the cable-laying ship.

By 1950 the Bell Lab team had the answer: The components of the booster unit were encased in an eight-foot-long sausage-like string of loosely coupled Lucite cartridges an inch in diameter. The string was fitted into a shield of overlapping armor steel rings stout enough to with-

stand the 6,800-pounds-per-square-inch pressure at the depths of the Atlantic. Then the whole thing was encased in copper, spliced into the cable and protected by armor steel wire and impregnated jute.

**With all this armor**, the repeater was barely 2.8 inches in diameter, and so flexible that the unit would bend around the seven-foot core of the drum used by the cable ship. This flexibility is all-important, for once the ship starts paying out cable it dares not stop, or the cable suspended between ship and ocean bottom may kink or snap.

The cable itself has a solid one-eighth-inch copper core. Thin strands of copper tape are wound around this and covered with polyethylene insulation, which is in turn wrapped with more copper





**OFF SCOTLAND**, the European shore tip and the eastern end of the ocean cable are stripped back for splicing. This is a delicate, hours-long job performed by highly skilled "jointers."

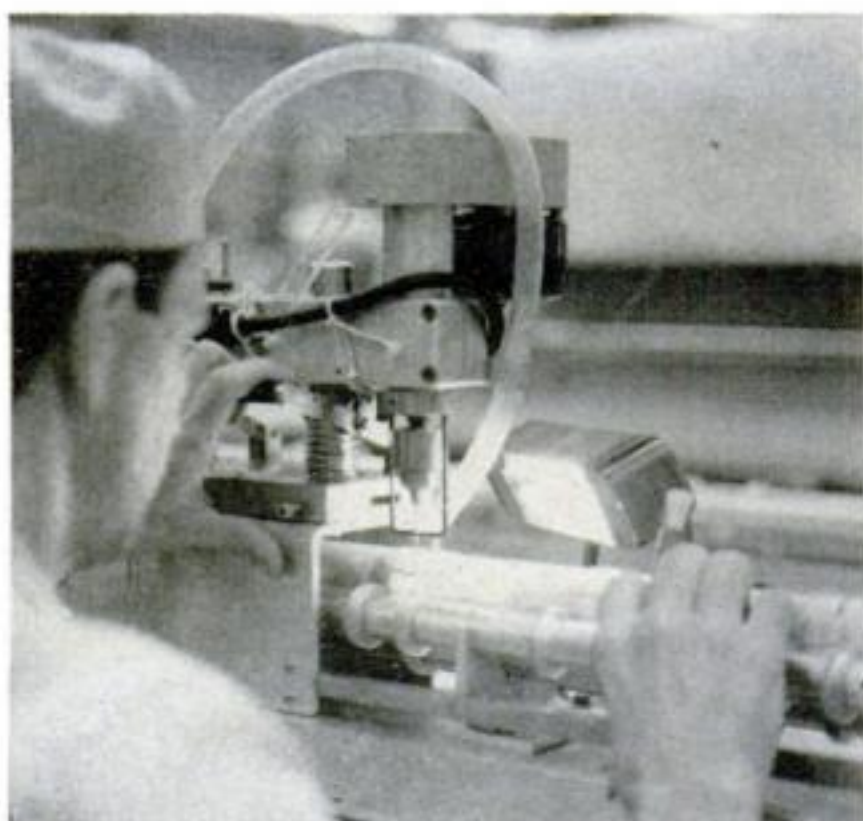
tape and sheathing to keep out marine borers. Then comes a layer of jute, in which is bedded strands of armor wire capable of withstanding a 26,000-pound pull. Paradoxically, the cable has to be armored twice as heavily for use on the continental shelf and near each shore, where trawlers, anchors and icebergs are a greater threat than mid-ocean hazards.

In August, 1952, A.T. & T. gave cable-laying the "go ahead," and Thompson and Vice-President George L. Best headed for London to make a deal with the British. Their experts had been working

on undersea telephone cable, too, and had laid cables to Norway, Holland and France. The British also had built the world's largest cable-laying ship, the 8,000-ton *Monarch*, whose four huge wells could handle 1,600 miles of the new phone cable—enough to stretch from the continental shelf off Newfoundland to a submarine plateau known as Rockall Banks, 500 miles west of Scotland. An agreement was signed making the British Post Office, the Canadian Overseas Telecommunication Corporation (a Canadian government corporation) and A.T. & T. partners in the project, sharing the cost estimated at 40 million dollars.

**One question** was the route. Twenty-one telegraph cables already lay on the Atlantic's bottom, and the phone cable's builders didn't want to cross any of them; repair ships grappling for the older cables might damage their delicate repeaters. After surveying the ocean bottom, the phone men settled on the great-circle route from Sydney Mines, Cape Breton (Nova Scotia), to Clarenville, Newfoundland, to Oban, Scotland, far north of existing cables. The east and west phone cables, each 1,950 nautical miles long, were projected 20 miles apart, to permit repairs to one cable without disturbing the other. (From Sydney Mines, the

[\[Continued on page 256\]](#)



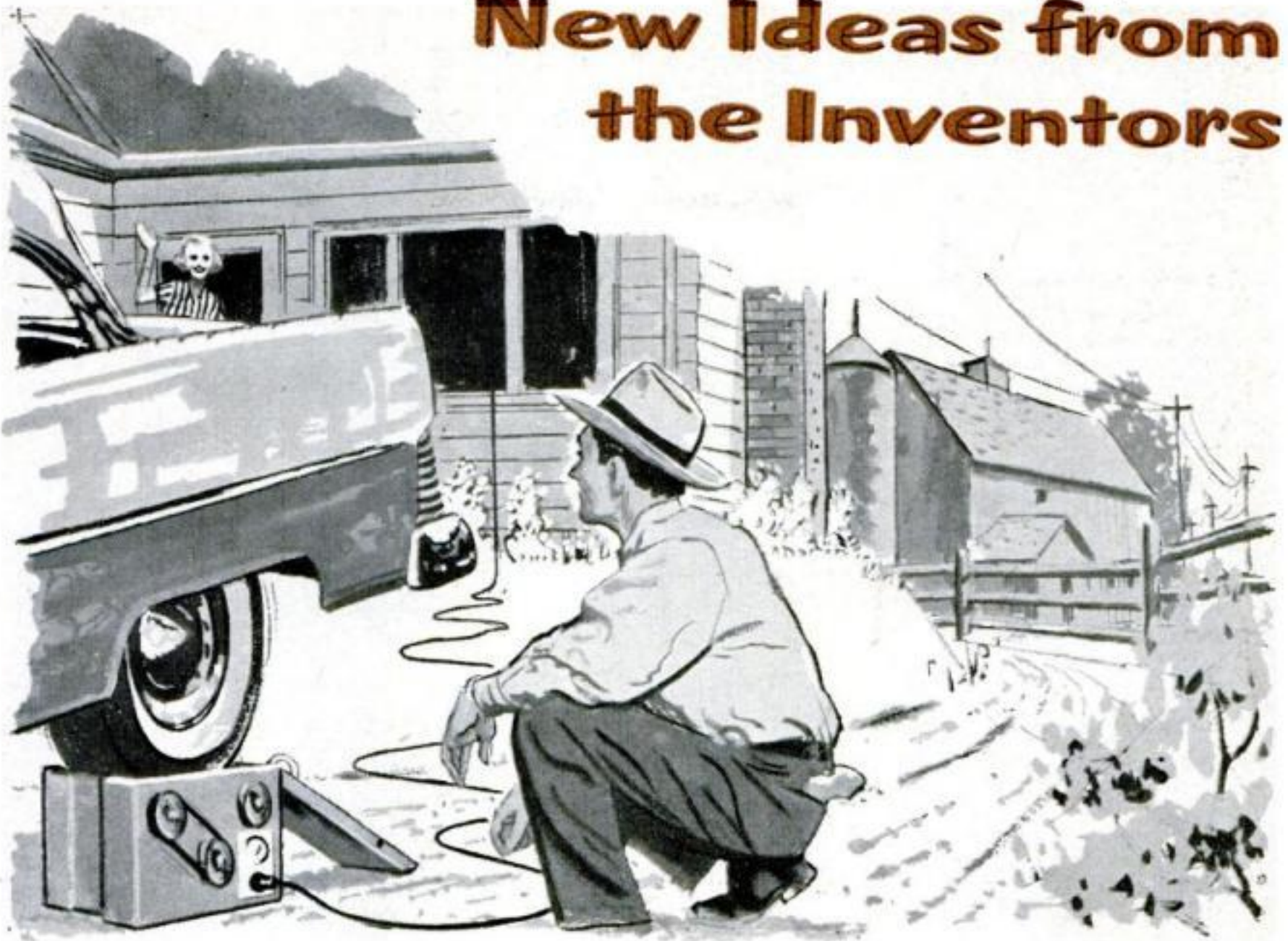
**PERFECTION IS REQUIRED** of cable's built-in amplifiers (shown above being manufactured). They must survive constant use for at least 20 years—it would cost \$250,000 to replace one.



**DEEP-SEA CABLE**, a combination of copper, plastic, jute and armor steel, was made in British plant and loaded directly aboard ship. It will carry 4,000 volts for its 36 circuits.



# New Ideas from the Inventors



**1 Car Power to Light Your House.** Driven by an auto wheel, this portable generator would supply electricity in emergencies. Its cover would serve as a

ramp. Rotation of a car wheel would spin two rollers; one activating the generator shaft, the other positioning the wheel. It would lock for back-off.

**2 Wrench Slide to Grip Nut.** With this attachment, an open-end wrench could engage a nut much more securely. The wrench jaws would grip the nut in the usual way, and the adjustable slide—overlapping the top of the nut—would keep the jaws from slipping downward.



**3 Earphone to Rouse Nodding Driver.** If a person wearing this headset started to doze, the device would buzz him awake. A mercury switch—that would close a circuit when tipped a few degrees—would be built into the unit along with the buzzer and tiny battery.

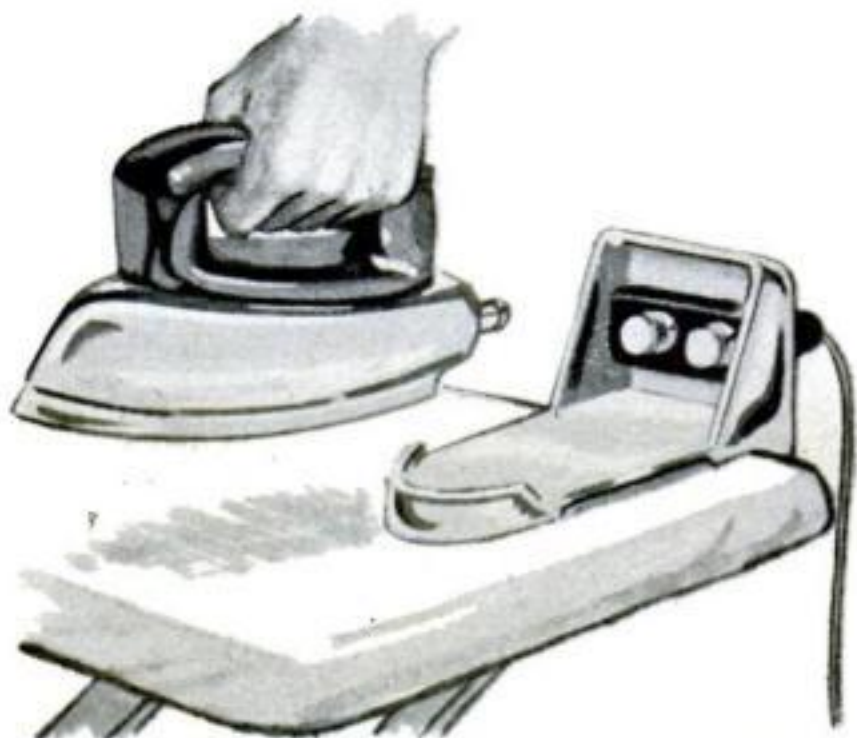


*Please turn the page for more new ideas*

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## More New Ideas from the Inventors



**4 Electric Iron to Shed Cord.** When prongs on the heel of this cordless iron touched contacts on a plug-in stand, current would be drawn, to heat iron during rest intervals. When the iron was removed, the contacts in the stand would be broken to avoid possible shock.



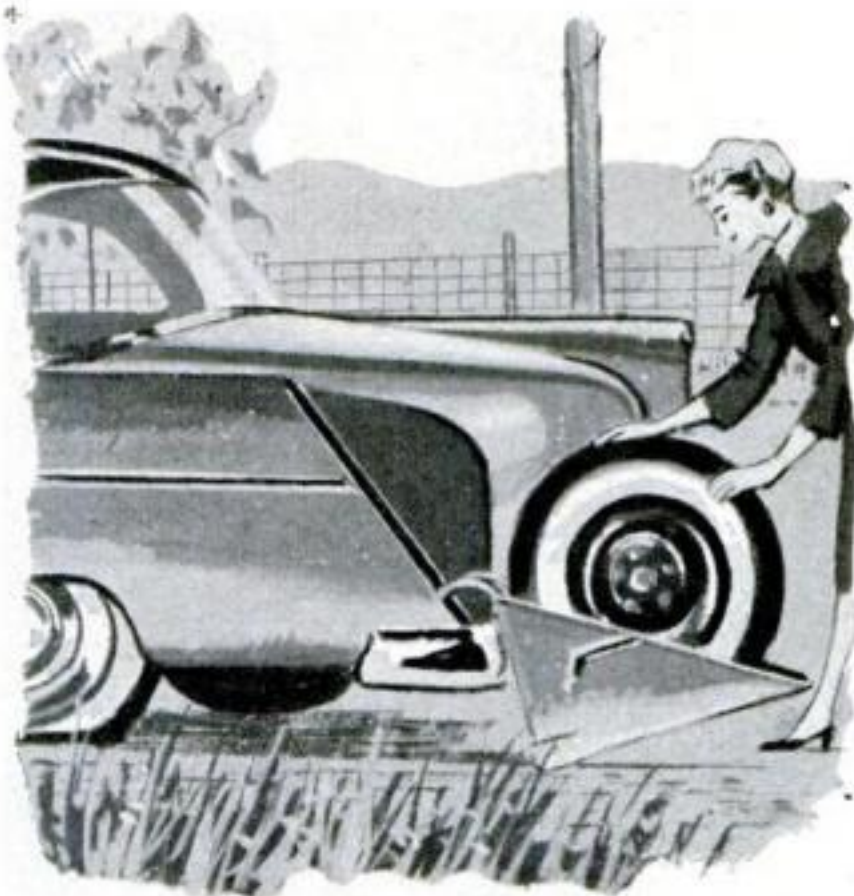
**5 Vest to Hold Paint Can.** You'd be able to keep both hands free for difficult, long-reach paint jobs if you could wear a bucket instead of carrying it. This vest would protect your clothing, and the projected shelf would adjust to receive paint cans of different sizes.

**7 Life Belt to Inflate Itself.** Hooked to your clothing, this compact, accordion-folded rubber hose wouldn't interfere with your movement. But if you fell into

water, a seal would dissolve. Gas from a self-contained cartridge would inflate and extend the hose so that the user could place it around his body.

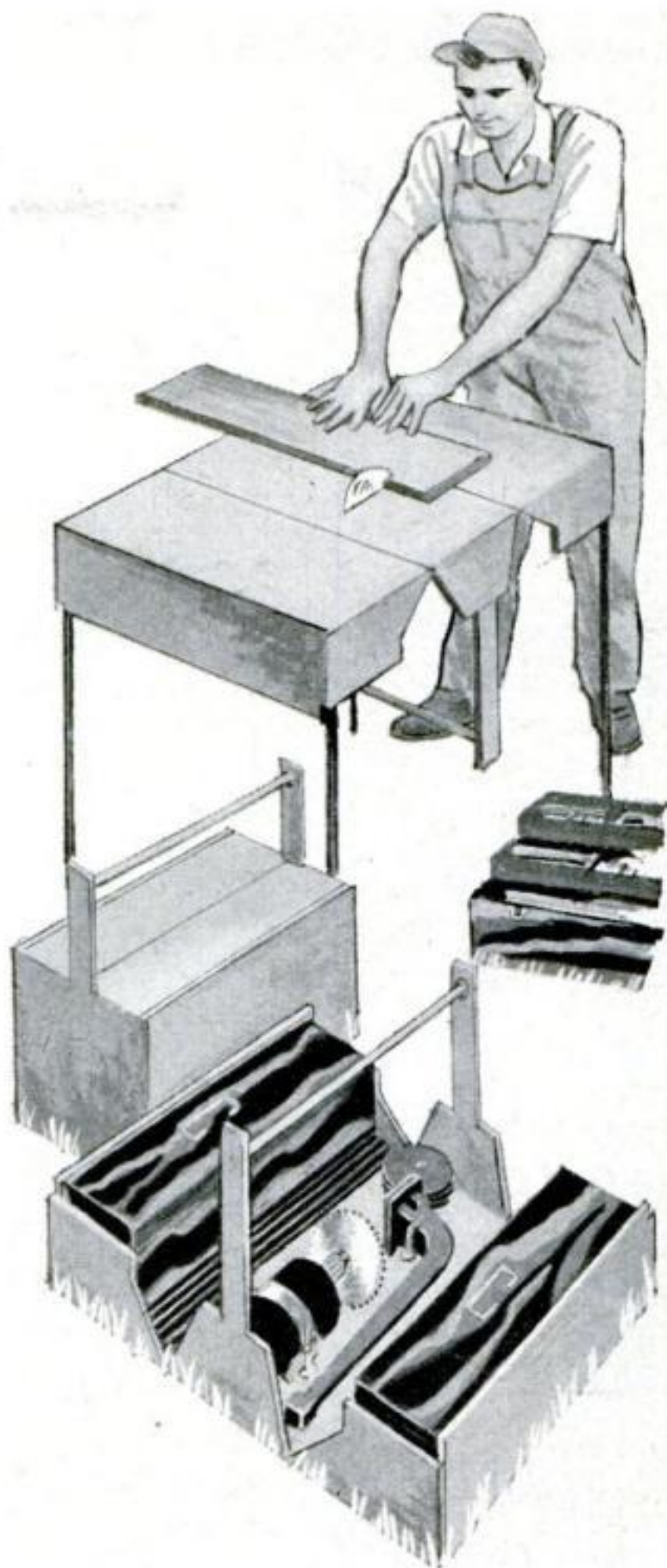






**6 Fishtail to Carry Spare.** Long, square tail fins on modern cars might be useful as well as stylish if they were made to serve as spare-wheel carriers. With a spring-assisted hinge, a letdown well like this might also ease the job of rolling out or replacing a spare tire.

**8 Tape to Shell Eggs.** You could shell a hard-boiled egg quickly and cleanly if it were served with a tabbed adhesive strip wrapped around its middle. You'd roll the egg to crack its shell, peel off the tape (with shell sticking to it), and slip the loosened ends off the egg.



**9 Kit to Carry Power Shop.** A portable toolbox, complete with slip-on legs, motor, arbor, attachments, and small tools and accessories, would permit a workman to bring power-tool convenience to outside jobs. The kit itself could be set up in several ways (as above) to serve as a saw table or workbench.

*U.S. patents on these inventions have been granted to: 1. Kenneth S. Lester, Mountain Lakes, N. J.; 2. Hyman D. Bowman, Raleigh, N. C.; 3. Warren E. Morrison, Minneapolis; 4. Arthur M. Werner, Tonopah, Nev.; 5. Bernard A. Walsh, San Diego, Calif.; 6. William R. L. Torrance, Vancouver, B. C.; 7. Milton W. Ivie, Atlanta, Ga.; 8. Ross O. Shideler, Indianapolis, Ind.; 9. Lawrence B. Barnett, Jersey City, N. J.*



# U.S. Plans 40,000-Mile

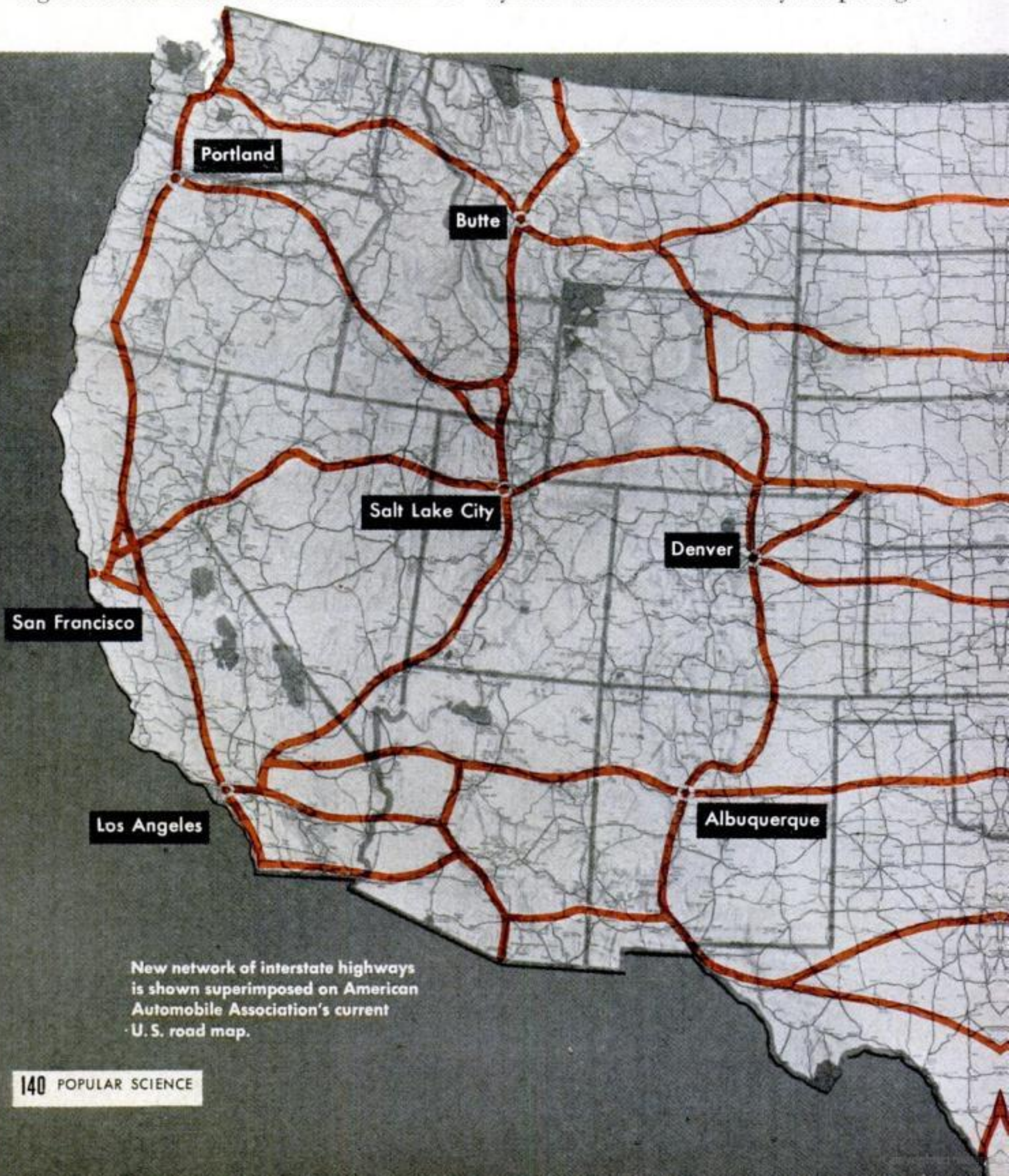
***"Greatest highway system ever conceived by man" will link 48 states and 209 big cities with multi-lane, high-speed freeways.***

**By Gardner Soule**

**O**N THE national system of Interstate Highways you'll be able to drive from Newport News, Va., right into the heart of San Francisco—or

from Houlton, Me., to San Diego—or from Miami to Seattle—without once stopping for a red light, pedestrian, cross-road, railroad track or tollhouse.

Two things will make the Interstate system different from today's superhigh-



New network of interstate highways is shown superimposed on American Automobile Association's current U.S. road map.



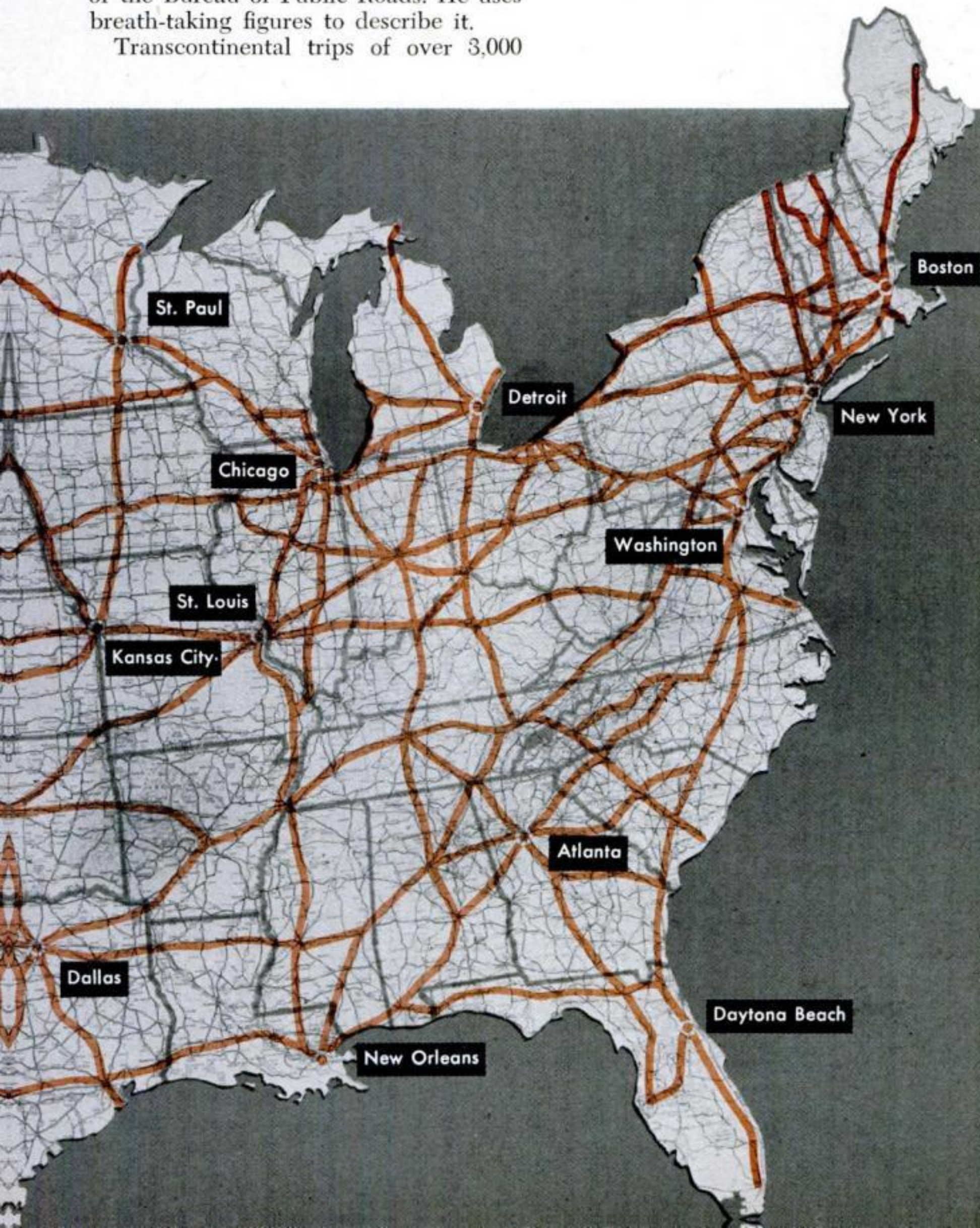
# 'Road to Everywhere'

ways and toll roads: (1) its tremendous size; (2) the wide range of services that it will provide.

"It will be the greatest highway system ever conceived by man," says R. E. Royall, chief of the research reports branch of the Bureau of Public Roads. He uses breath-taking figures to describe it.

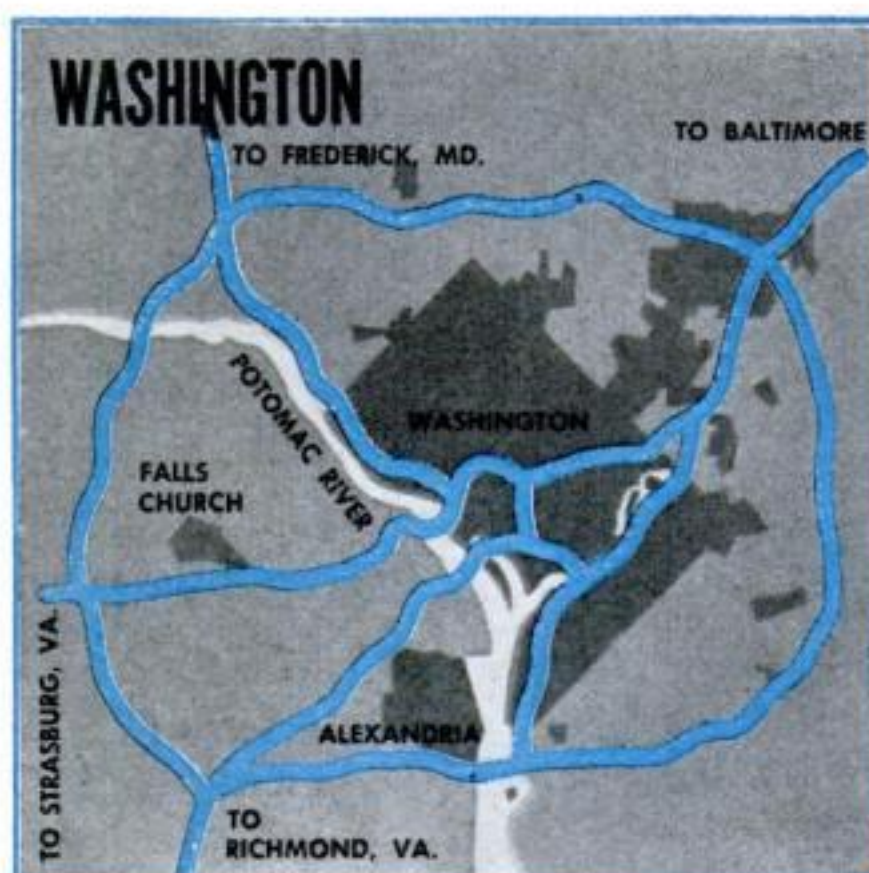
Transcontinental trips of over 3,000

miles with no stops except for food, sleep, or gasoline are just one indication of its size. The Interstate, Royall says, will be a network of 4-, 6- and 8-lane freeways that will extend 40,000 miles—long enough to encircle the globe 1 7/10





## New maps show how Interstate Highway will reach cities



times. The proposed system of roads will:

- Connect all 48 states.
- Join 209 of the nation's 232 cities of more than 50,000 population.
- Take you to, or near, the center of each city it reaches by means of 6,700 miles of multi-lane direct routes or spurs, sometimes elevated over city streets.
- Pass through, and connect, all farm belts and all sources of raw materials, such as oil, timber, uranium and coal.

**A new concept.** The Interstate, Royall explains, represents a major change in U.S. highway thinking. Royall, who has been with the public roads bureau for 40 years, is 65. He has seen every change in highway planning as it developed.

"When I was a boy," he says, "most roads were only a few miles long and ran only to the nearest railroad stations. Then they joined towns. Next they joined cities."

"For a long time, roads were built mainly to join together two or more cities. The Interstate will indeed connect cities—most of them. But its concept goes much further."

"Like the street system of a town, the Interstate is designed not just to link several points, but to serve an entire area. That area is the U.S."

"The Interstate will not be a new ribbon of road. It will be, instead, the

framework of the whole U.S. highway system."

He adds: "I think we've got to have it."

Many persons agree. So many, in fact, that the Interstate is hardly questioned at all in the vigorous debate on highways now going on in Congress.

A bill now before Congress proposes that the U.S. provide 90 percent of the funds, with the states adding 10 percent, a new high percentage for Federal money for roads. But even without any increase in Washington's percentage, which would speed up construction, the Interstate is virtually certain to be built. That's because it has been planned by the highway departments of the states themselves to meet the urgent needs of U.S. drivers. Royall tells what the system will do:

**1. "It will carry you to work."** It may surprise you to learn that this continental network is designed to get a great many people to their jobs. But it is.

Around 80 percent of U.S. citizens drive to work. Many live in suburbs. Around 80 to 90 percent of all cars approaching any city are going to that city—not through it. A No. 1 military requirement for U.S. highways is not that they permit the movement of mass armies—it is, instead, that they help keep workers at war production.





That's the big reason for those free-ways that will lead into every city on the Interstate. They will reach the centers of cities, and they will thereby reach seven-eighths of the nation's manufacturing and industrial facilities.

Plans for entrances into 102 cities were announced by the Bureau of Public Roads last September—the final detail in completing the design of the Interstate.

2. **"It will reduce traffic jams."** The nation's biggest jams, Royall explains, are caused today by people going to or from work. The Bureau of Public Roads in 1955 surveyed the nation for the heaviest

traffic, and came up with these examples:

At a focal point on the Hollywood freeway, near Los Angeles: 290,760 vehicles were counted on its busiest day, July 18; 172,000 on an average day. "The greatest movement of vehicles at any single point in the world," Royall says.

On Lake Shore Drive near Aldine St., Chicago: 142,503 vehicles on June 13.

On Highway Bridge, which carries U. S. 1 south from Washington, D. C.: 117,333 vehicles on a Friday in July.

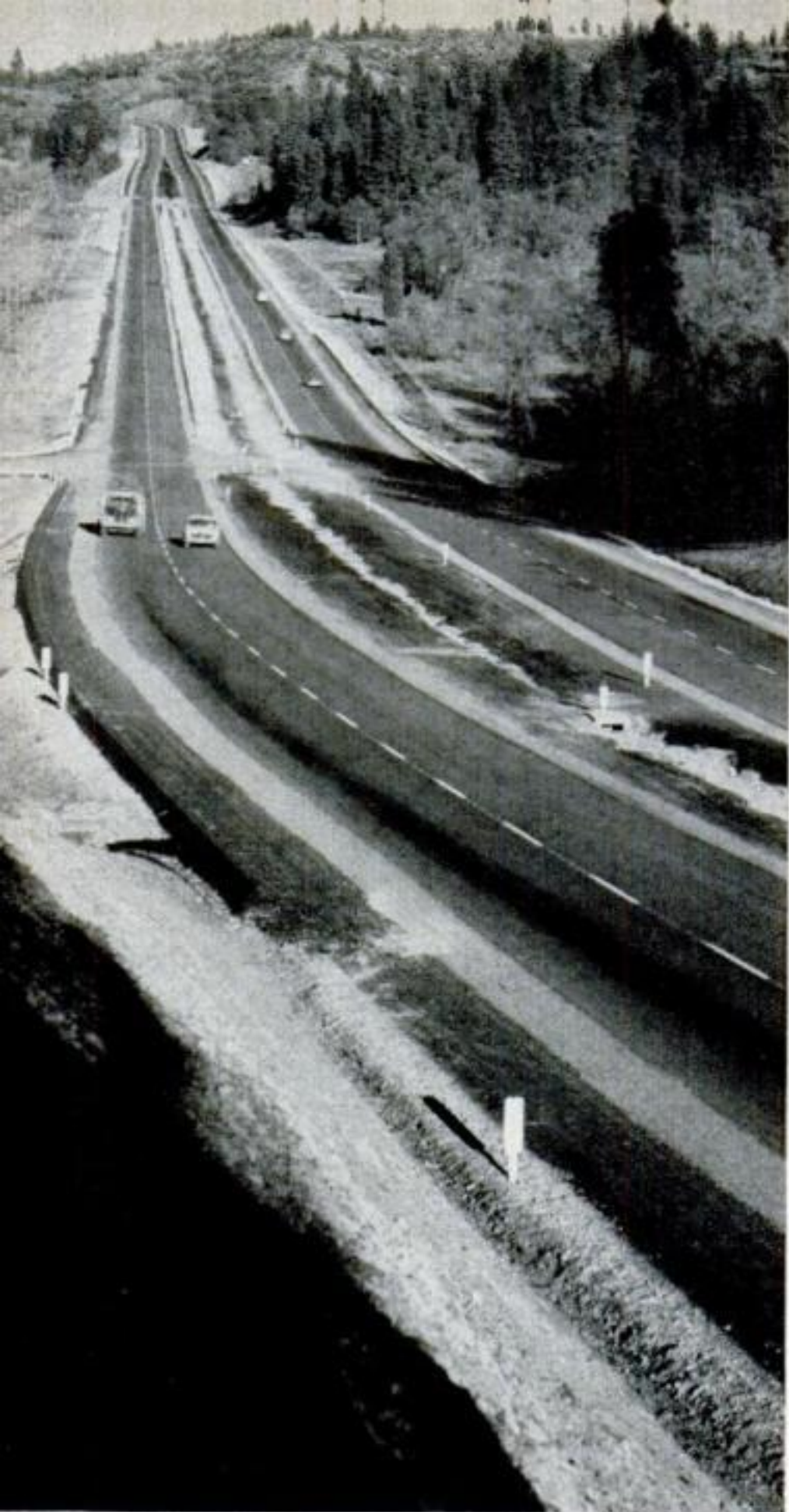
"These figures," explains Royall, "are so large that they don't give you a clear idea of the traffic involved. Let me tell

## Dream Highways for Dream Cars

THIS month's cover (right) carries highway planning beyond present blueprints to show some possible future developments that are now engineers' dreams. On the dashboard in the foreground is a split television screen. The left half serves as a rear-view mirror, connected to a peephole TV camera above the rear bumper. The right half shows the best speed for current traffic conditions, as computed by a remote electronic brain and transmitted to all cars on this stretch of highway. If the driver wishes, he can turn over operation of the car to an area control tower. Then speed and steering will be regulated through a guide strip in the road.







**NEW U.S. 40**, sweeping gracefully through the California hills, is typical of the broad-shouldered freeways that will join all 48 states.

**OLD U.S. 40**, shown along another stretch of its route through California, holds traffic down to the pace of the slowest vehicle.



you this: On an ordinary two-lane road, when traffic goes up to 4,000 vehicles a day, you think it's time to add lanes."

Accordingly, there will be many lanes in the Interstate. Twenty-three hundred miles of it through open country will be six lanes or more. Similarly, the 6,700 miles leading into cities will be, in many cases, six or eight lanes.

**3. "It will make possible longer vacation trips."** In distance traveled, says Royall, "the Interstate won't save you much over today's roads. But in time spent driving, you'll save a great deal."

Royall, who lives in Washington, thinks that it will mean he can vacation in New England more easily. "Today," he says, "I can get around all those cities between here and there—but I hate to try it."

The Interstate will be constructed either by widening and improving highways that exist, or by laying down new freeways parallel to today's roads.

Florida, a state that wants badly to be reached by vacationists, has jumped the gun and is right now improving its section of U.S. 1 into a four-lane freeway that will be part of the Interstate.

All other parts of the nation will also be easy to reach when the Interstate is completed. Besides that, it will connect with the Inter-American Highway at Laredo, Tex., and at the Canadian border with roads to the Alaska Highway.

**4. "It will provide satisfactory speed with safety."** Royall explains: "We'll incorporate into it everything fully established for safety, convenience and facility of travel."

Roadways in each direction will be separated from each other. Division strips will be from four to 12 feet wide (in some cities and narrow mountain passes) to 40 feet (country)—or wider.

In some places, the roadways in each direction will be so far apart that, driving on one, you won't see the other one. You may be driving west on a mountain, while the eastbound lane is in the valley below. This will make parts of the Interstate the first cross-country highways to be one-way.

*[Continued on page 250]*





## This Rolling "Ranch House" Features a Real Fireplace

CHILLY nights on the road you light a fire in this mobile home. Besides the wood-burning fireplace, its living room features large picture windows, decorator drapes and wall-to-wall carpeting.

The 10-by-50-foot Wedgwood "Ranchome," made by Palace Corp. of Flint, Mich., has an overhanging roof



that folds in transit, private bedrooms, bath and a kitchen with a washer.



## Lineman Fishes For Trouble With Glass Pole

WITH hook, wrench or saw attached to the end of a new telescoping "hot stick," a lineman for the Rural Electrification Administration can work on power lines 28 feet up and still keep his feet firmly on the ground.

Made of fiber-glass, the pole weighs less than seven pounds for easy manipulation of special tools at top. It folds to 4½ feet.

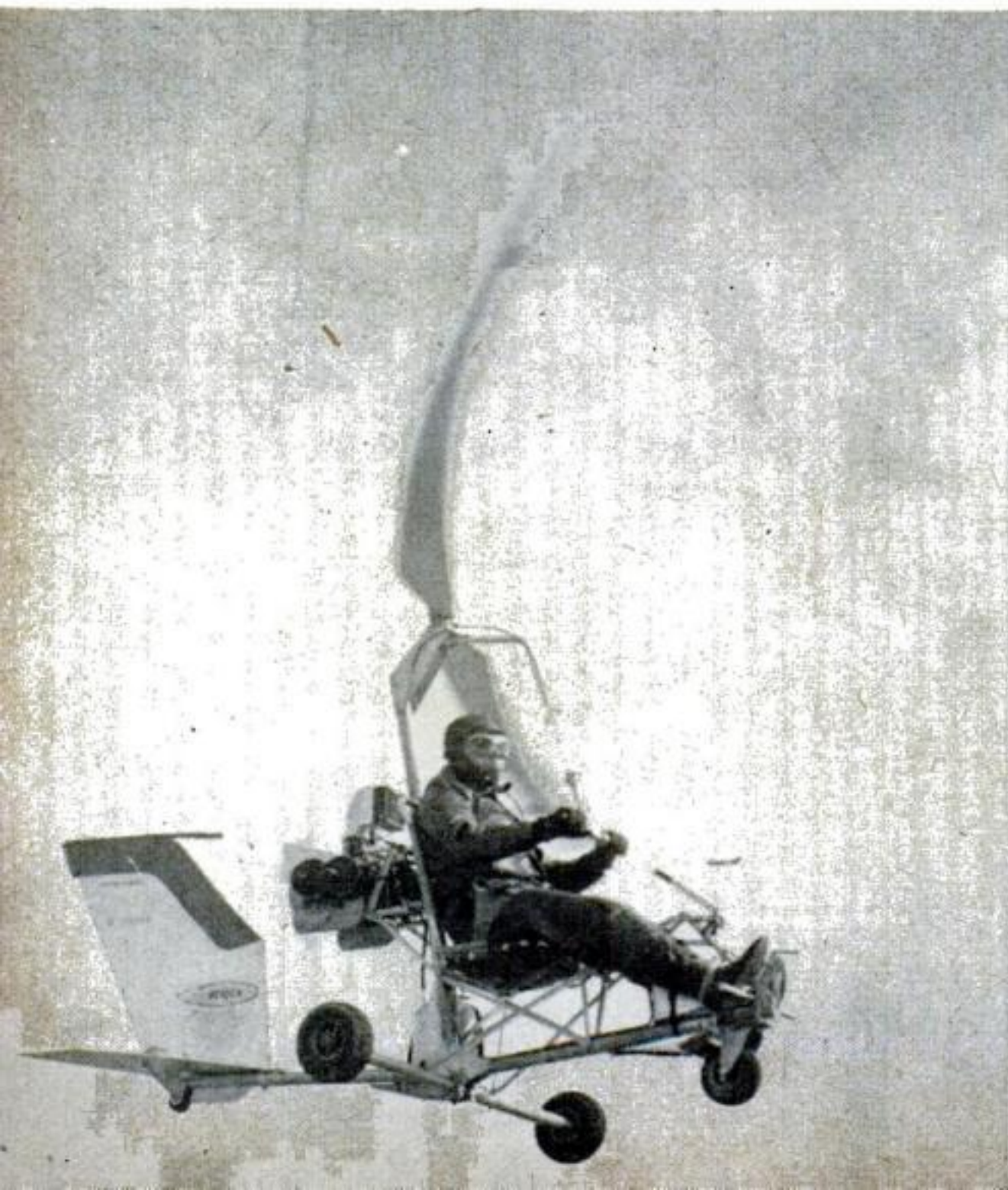


# New in Aviation



**Double Scoop** Powered by two Rolls-Royce turbojets, Britain's new Vickers Supermarine N.113 fighter, is said to be "the fastest and

most powerful aircraft ever designed for carrier operations." To cut its approach speed, air ducted from the engines is accelerated over the flaps to boost lift.

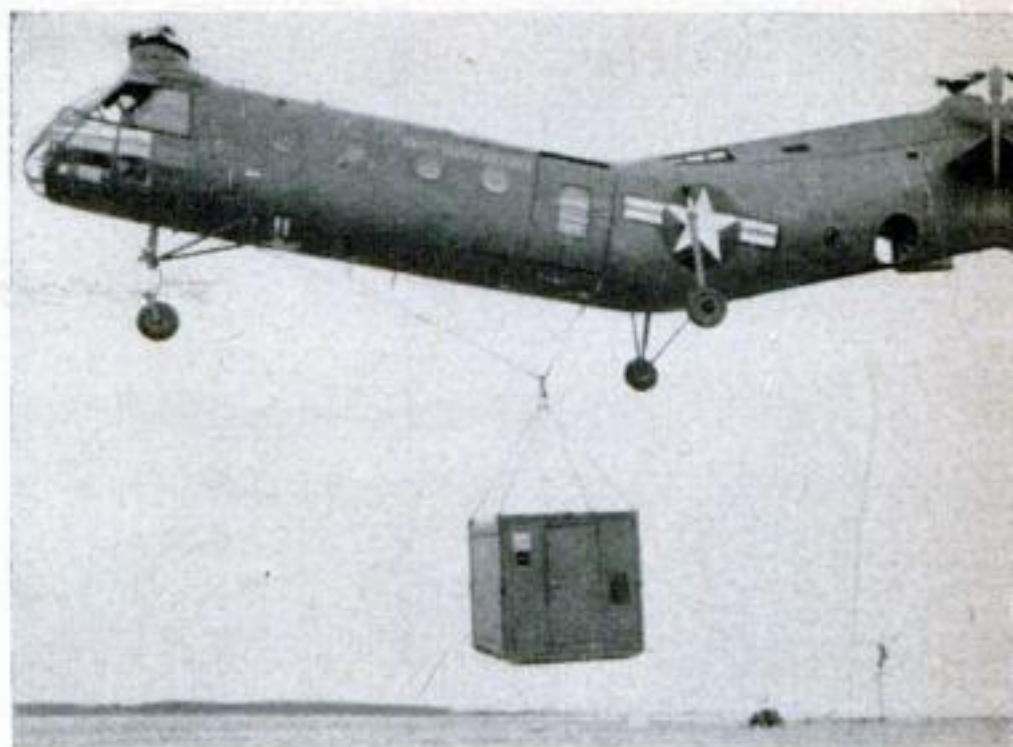


**Gyro-Copter** A pusher propeller spun by a 40-horsepower engine is the power behind Inventor Igor Bensen—and his air flivver. The overhead rotor blade serves as a wing. Unlike a true helicopter, the blade is not motor-driven but depends on air movement in flight for rotation. It does make possible climbs and landings at steep angles. If the engine fails, auto-rotation lets the craft descend slowly. This powered model is a modification of Bensen's rotary-wing kite (PSM, July '54, p. 98; March '55, p. 105).

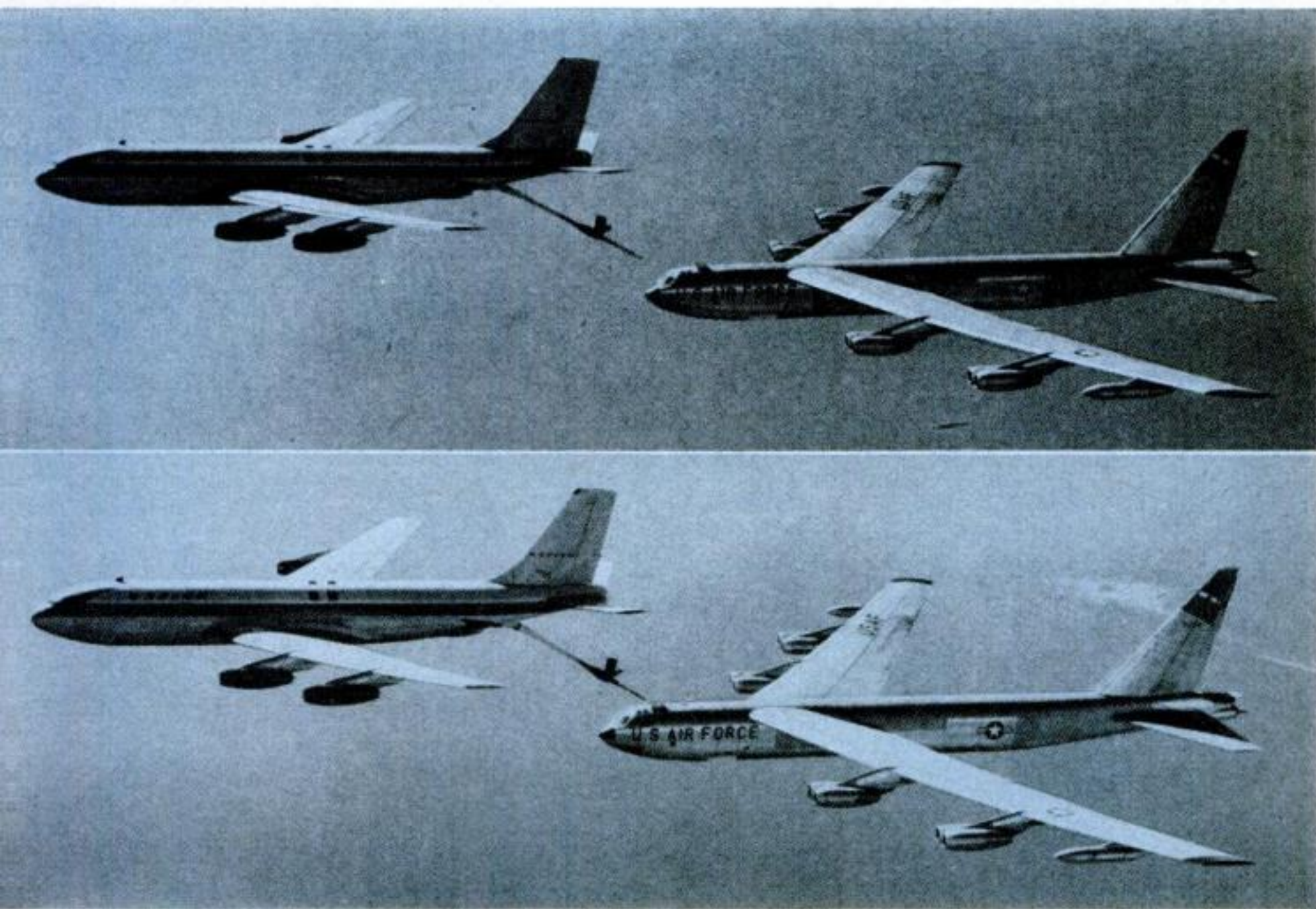




**Slot Chute** A paramedic can steer this new parachute, enabling him to come down near an injured man. It can be opened at higher speeds than most parachutes, has a slower rate of descent, and has less opening shock.



**Helicop-Hut** A new lightweight Air Force shelter is designed to take rough helicopter handling. Made of aluminum, the hut can be equipped as a radio station, photo lab or first-aid station and dropped in inaccessible areas.



**Jet Refuels Jet** In-flight refueling at higher speeds and altitudes is made possible by the KC-135 tanker-transport, shown above maneu-

vering and then connecting its fueling boom to an eight-jet B-52 bomber. The KC-135 is the military version of Boeing's 707 jet airliner, now in production.





**EVEN A WOODSMAN MIGHT BE FOOLED** by this realistic-looking cabin of plastic logs and log

ends, created in Hollywood and, because it's light, easily transported to a Wyoming location.

## Why Hollywood Builds Plastic Log Cabins



**SCULPTING CLAY MODELS** of architectural ornaments to be cast in plastic, these studio artists work from drawings on which the size and finish of the ornaments have been marked.



**MAKING A FLEXIBLE MOLD** for plastic casts, this workman is pouring raw material into a frame of duplicate *plaster* casts with space between them. Resultant mold hardens to rubbery state.



**A MOLDED PEPPER TREE** dominates this set from M-G-M's "Brigadoon." Plaster impressions of both halves of a real pepper tree were first made. This is a plastic duplicate of the plaster.



**YOU'D BE SURPRISED** at how simple it is to move these heroic plastic statues around a movie lot. If they had been made of plaster, it would take a sizable crew to shift them into position.



**O**NE of the most versatile performers in the movies is polyester resin, a plastic. It does perfect imitations of marble, brick, stone, bronze, brass, jade, quartz and alabaster. It skillfully apes freshly cut logs, live trees and carved wood hundreds of years old.



**CREATING AN ARCHITECTURAL COLUMN** of plastic, workmen lower a plastic-lined plaster mold of half the column onto an identical mold. Heating fuses the two halves together.

Before this plastic was discovered by Hollywood, it played a humbler role as a laminating material for small boat hulls, airplane and auto-body parts. Now it portrays costly statues, ornamental fireplaces, lofty walls, grilles, hardware, paneling, boulders, rough-cut stonework or polished columns.

The secret of its versatility lies in the mixing of the raw material, a colorless syrup, with both dry and paste colors and filler to imitate a remarkable variety of textures and hues. The formulas were worked out by experiment. The plastic brew is then cast in any shape desired.

Polyester resin has nearly elbowed casting plaster off the sets at M-G-M Studios, where the accompanying pictures were taken. Plaster casts of objects that are now formed of plastic were so heavy that they required large crews and bulky equipment to move them. The plaster frequently chipped, often broke. Its successor—durable plastic—is so light that two men can carry a wall, or one man a statue taller than himself. **END**



Battle close-ups sent by TV...

..to command post



## GI Cameraman Carries a Television Transmitter on His Back

Designed for front-line use, this Army Signal Corps TV camera shoots action a mile off and relays it, without cables, to a command-post receiver (right) half

a mile away. There an officer monitors, on his jeep-mounted screen, as many as five GIs toting the 47-lb. transmitters. A handy-talkie (far left) picks up sound.

### They Say Now...

DR. WILLARD F. LIBBY, COMMISSIONER, ATOMIC ENERGY COMMISSION: *"The commission's policy on the peaceful uses of the atom is to develop as many as possible as soon as possible, always remembering that its first responsibility is the defense and security of this country—and that this too may, in itself, if it gives us peace, be the most important of the peaceful uses."*

DR. JESS H. DAVIS, PRESIDENT, STEVENS INSTITUTE OF TECHNOLOGY: *"To keep ahead of the Soviets . . . [we] must have engineers who combine with 'know-how' a 'know-why'*

*—a broader, deeper knowledge of the laws of science and how to use them."*

JAMES H. ROBERTSON, ASSISTANT DEAN, UNIVERSITY OF MICHIGAN: *"The trick is not merely to draft more students . . . it is the far harder task of giving them every opportunity to discover . . . the excitement and satisfaction that science and engineering can offer to those who have the talent."*

JAY DOBLIN, DIRECTOR, ILLINOIS INSTITUTE OF TECHNOLOGY: *"In the house of the future a housewife's most important appliances will not be for food preparation, but for food storage. . . Cooking, as we now know it, will be considered strictly a hobby."*



# Newest, Littlest V-8 Has Hidden Muscles

By Devon Francis

**F**OUR years ago American Motors backed off from the engines powering their cars, took a hard look and decided to build a V-8. Now they have pulled the shrouds off it.

The new engine is a tidy and conventional, but deceptive, package. Although horsepowers have been hitting fresh crescendos practically every hour on the hour, the people who make Nash and Hudson are content to announce an engine of a modest 190 horsepower. It has

**NEW V-8**, producing 190 hp. at 4,500 r.p.m., is installed in Hudson Hornet Special. Its torque is 240 lb.-ft. at 2,000 r.p.m. Bore and stroke are 3½" by 3¼". Block is 14 inches shorter than the flathead that it now replaces.





the smallest displacement in Detroit's stable, but—

It was designed for expansion. It can be edged on up in power for years.

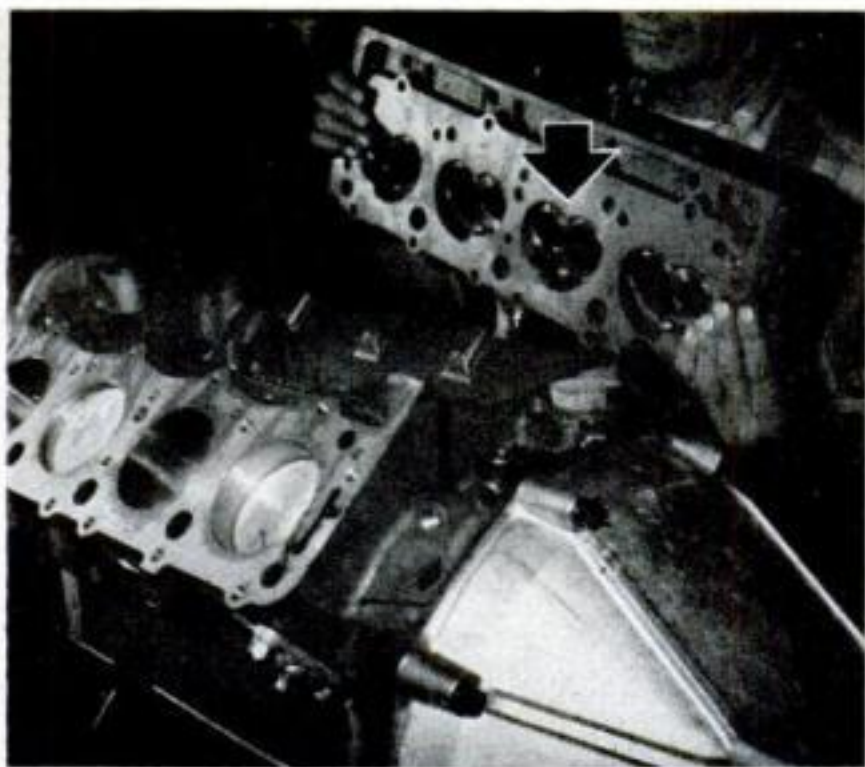
*As the engineers put it*, the company wanted "an engine that would be flexible enough to be readily adaptable to future displacement requirements, compression-ratio changes, and any of the other forward-reaching revisions of the automotive industry today."

That means, "Stand back, Buster—we may want to bulge a muscle."

"This engine," says George Romney, company president, "was designed within our traditional concept, stressing both economy and performance. We think we have struck a nice balance between the two. Moreover, it's compact. That, too, is in our tradition."

Now going into Hudson Hornet Special and Nash Ambassador Special cars—American Motors' medium-priced vehicles—on the production line in Kenosha, Wis., the engine is anything but tricky. The designers have pulled no rabbits out of a hat. But by tedious cut-and-try, they have managed to achieve an astonishing smoothness at both idling and highway speeds, a respectable acceleration, and a money-in-the-pocket fuel economy on regular-grade gasoline.

*I drove the Hornet Special* on a brisk February day with the thermometer



**COMBUSTION CHAMBERS** contain curlicue (arrow) to swirl the incoming air-gas charge and promote even burning. Valve diameters are: intake, 1.79"; exhaust, 1.4". Lift is .375".



**FIFTH WHEEL**, of voltage type calibrated in m.p.h., measured the gas mileage. It automatically gave distance traveled in window on the burette instrument (picture at far right).

glued to a point just below freezing. With overdrive, I had a 4.4-to-1 axle. The tank carried 90 pounds of gasoline. One passenger was aboard.

After a warmup, I ran with and against the wind. From a standing start to 60 miles an hour, as indicated by a fifth wheel, the runs averaged out at 14.2 seconds. In accelerating from a steady 40 miles an hour to 60, the engine dug in its cleats—the time was 6.8 seconds.

*With the overdrive button pushed in*, the fuel meter registered the following miles-per-gallon readings:

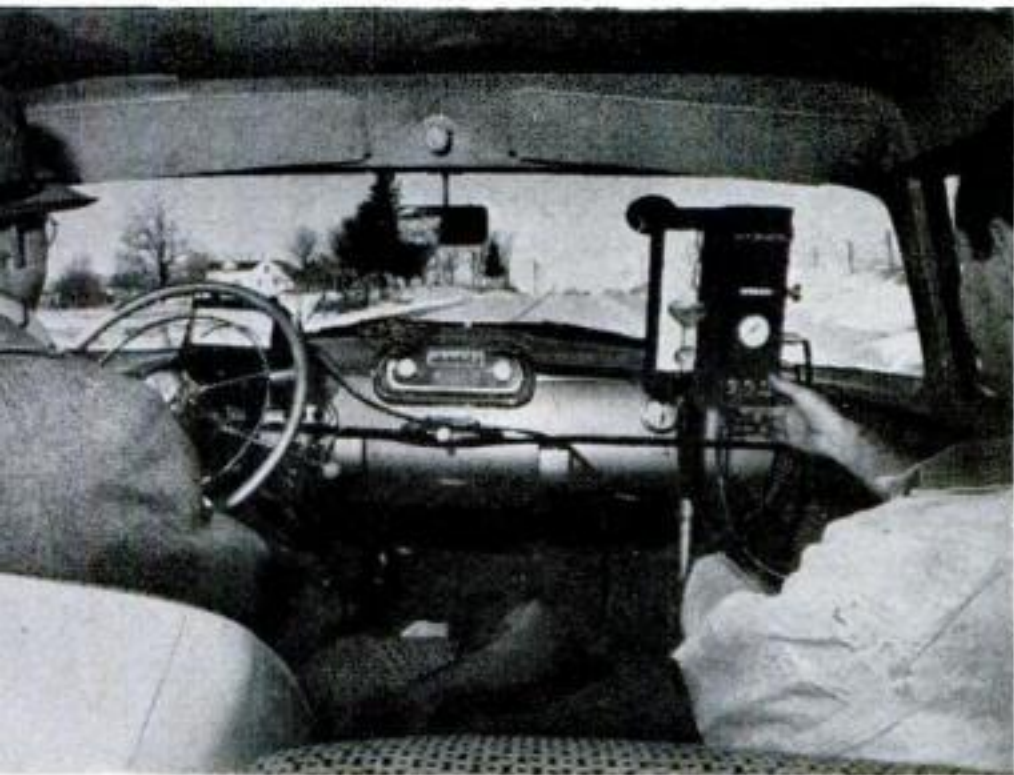
| Speed (m.p.h.) | Fuel (m.p.g.) |
|----------------|---------------|
| 30             | 23.3          |
| 40             | 21.8          |
| 50             | 19.3          |
| 60             | 17.2          |
| 70             | 14.6          |

The engineers at the company's proving ground told me that in 80-degree temperatures in Florida, they had averaged—in overdrive—26.7 miles to the gallon at a steady 30 miles an hour.

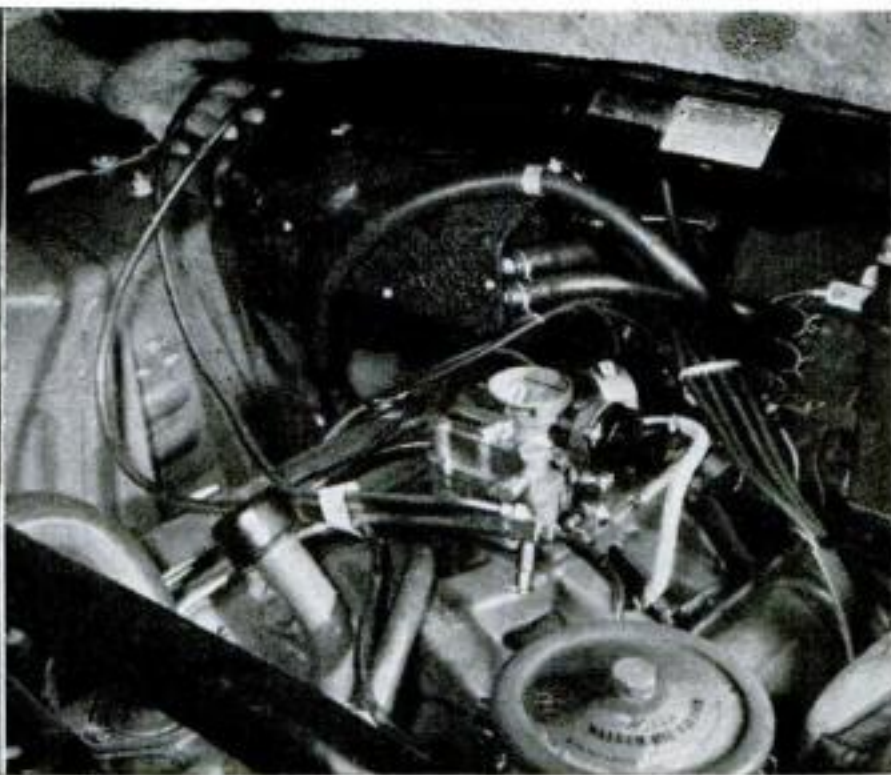
The engine ticks over with the ease of a sewing machine. The company got extra smoothness out of its V-8 by careful balancing of crankshaft and piston forces, and by fighting off scarlet temptations.

*The combustion-chamber design* is a case in point. High-compression pressures existing at the moment the fuel is ignited in a cylinder give an engine added





**CONSUMPTION OF GAS** was cut off at one-tenth gallon by toggle switch, and fuel economy figured on a chart. At 8:1 compression ratio, new engine performs nicely on non-premium fuel.



**PLASTIC FUEL LINES** led from burette to the two-barrel carburetor (shown here with air cleaner removed). In overdrive, doing 60 m.p.h., the engine turns over at only 2,320 r.p.m.

snap, power and torque. But they are an open invitation to detonation and fouled plugs. The air-gas charge may not burn evenly under load, which causes pinging. With the high voltage required and the heat developed, incomplete combustion not only can deposit carbon in cylinder heads but can belt down the gas mileage as well.

The Hudson-Nash people looked Satan in the eye and stared him down. They designed a combustion chamber that required a fat spark advance—an ignition of the fuel long before the piston got up there at the top of the cylinder and produced peak compression pressures. So the air-gas charge begins burning early. And it burns evenly. The “flame front,” as the engineers call it, advances progressively. Surplus heat is avoided. So is fouling.

**Valve timing** got the same treatment, for the same reason. Valve “overlap,” which is the amount of time that both the intake and exhaust valves are open simultaneously, frequently is used to step up an engine’s performance at high speed. It’s like doping an indifferent nag 10 minutes before post time. It works fine when you’re going fast, but it’s rough when you go slow.

Overlap in the new engine is at only 23 degrees of the crankshaft circle. As a result, it idles beautifully, responds

smoothly, supplies power at low speed and saves gas. If the valve timing put any penalty on Hornet acceleration at 70 miles an hour, it wasn’t evident in the accelerator pedal.

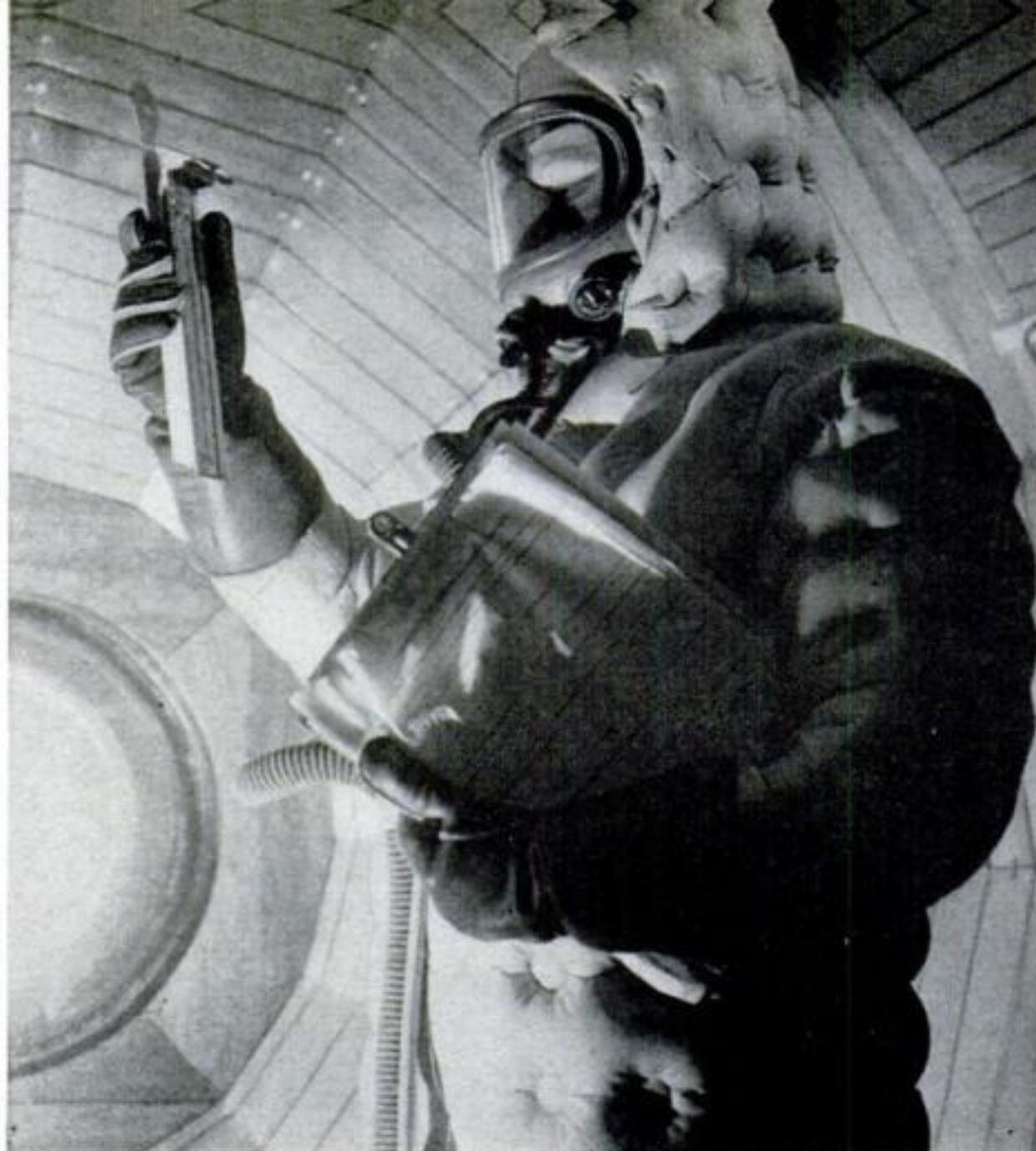
For all the conservative approach that American Motors adopted in tackling the design of the engine, it still develops an unusual amount of horsepower per cubic inch of displacement: .76. For the industry as a whole, the figure for the 1956 crop of V-8s is only .72. Like almost all engines of its type, the Hudson-Nash job is “over-square”—its bore exceeds its stroke.

It’s the second new overhead-valve engine to be announced by the company in less than five months. The Rambler got a new cylinders-in-line power plant last December (PSM, Jan. ’56, p. 148).

**How far up in horsepower** the company will push its home-grown V-8 remains to be seen. It deliberately designed a “sleeper.” The valves, crankshaft, connecting-rod bearings and even such components as the water and oil pumps are king-size to provide for expansion.

If anybody would like to guess, the engineers at the proving ground figure they could bore the holes in the cylinder block big enough for maybe 330 cubic inches of displacement—a boost of 80. American Motors says that should be good for a potential 300 horsepower. **END**





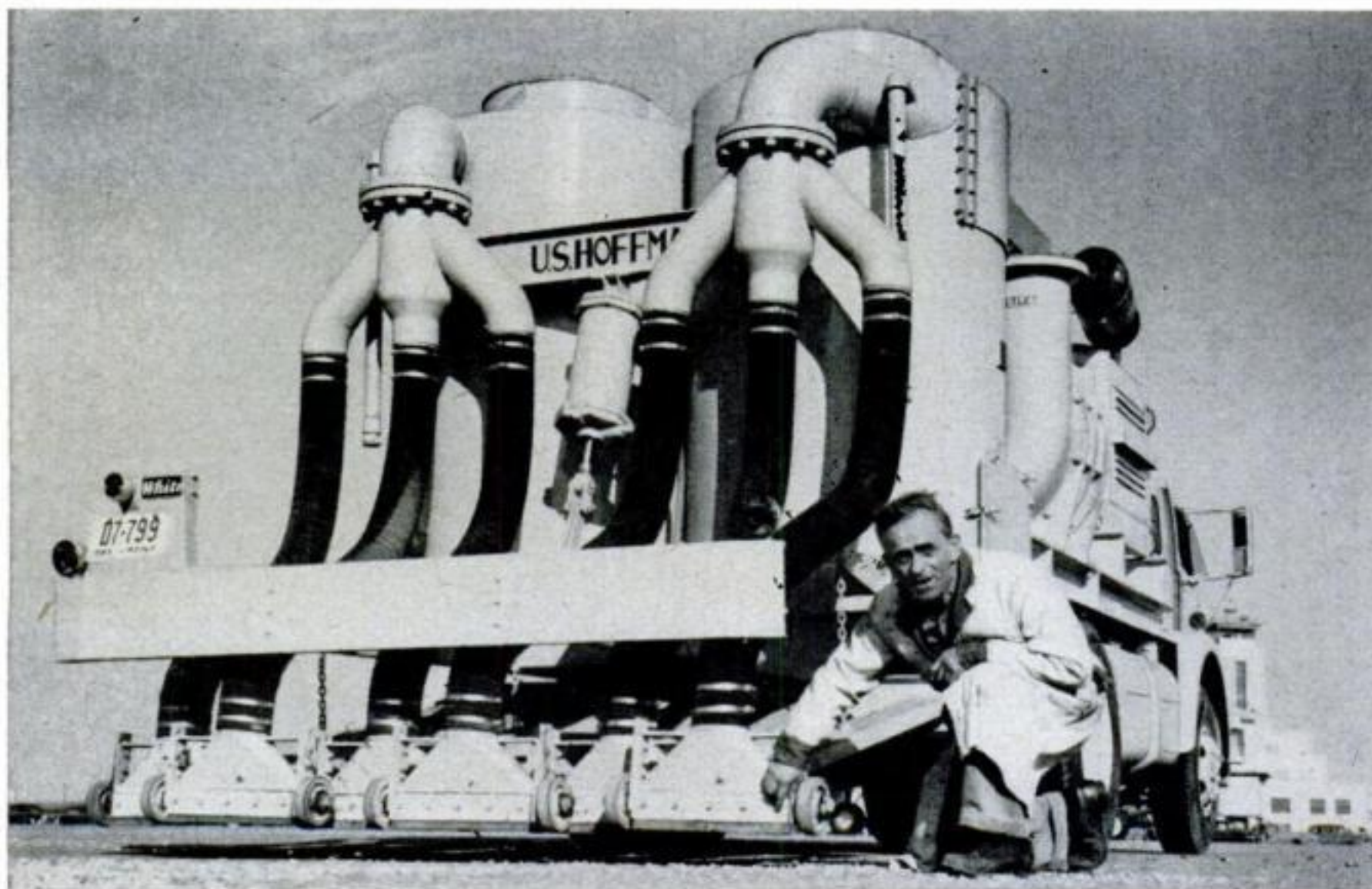
## 20 Miles Up, 160° Down— On the Ground

THIS quilt-down man is reading a thermometer that tells him how cold he would be if he weren't bundled up in layers of warm clothing inside a special inflated suit. The scene is in Avro's new altitude chamber in England where altitudes up to 100,000 feet will be simulated and temperatures brought down to minus 160 degrees. The chamber can also subject materials to heat of 150 degrees. Purpose: To test new aircraft components.

## World's Biggest Vacuum Cleaner Makes a Clean Sweep for Jets

DEBRIS sucked up from runways into the air scoops of jets can cause serious engine damage. This 15-ton monster has six suction scoops that have the energy

of 1,200 home vacuum cleaners. Sucking in air at a rate of 350 miles an hour, the machine can remove all litter from a two-million-square-foot area in eight hours.







**1. Outboard has knotometer.** You can tell how fast you are going from the dial on this outboard motor. It registers speed in both knots and miles per hour. The device, new on outboards, measures pressure of the water rushing past; the dial converts it to a speed reading.



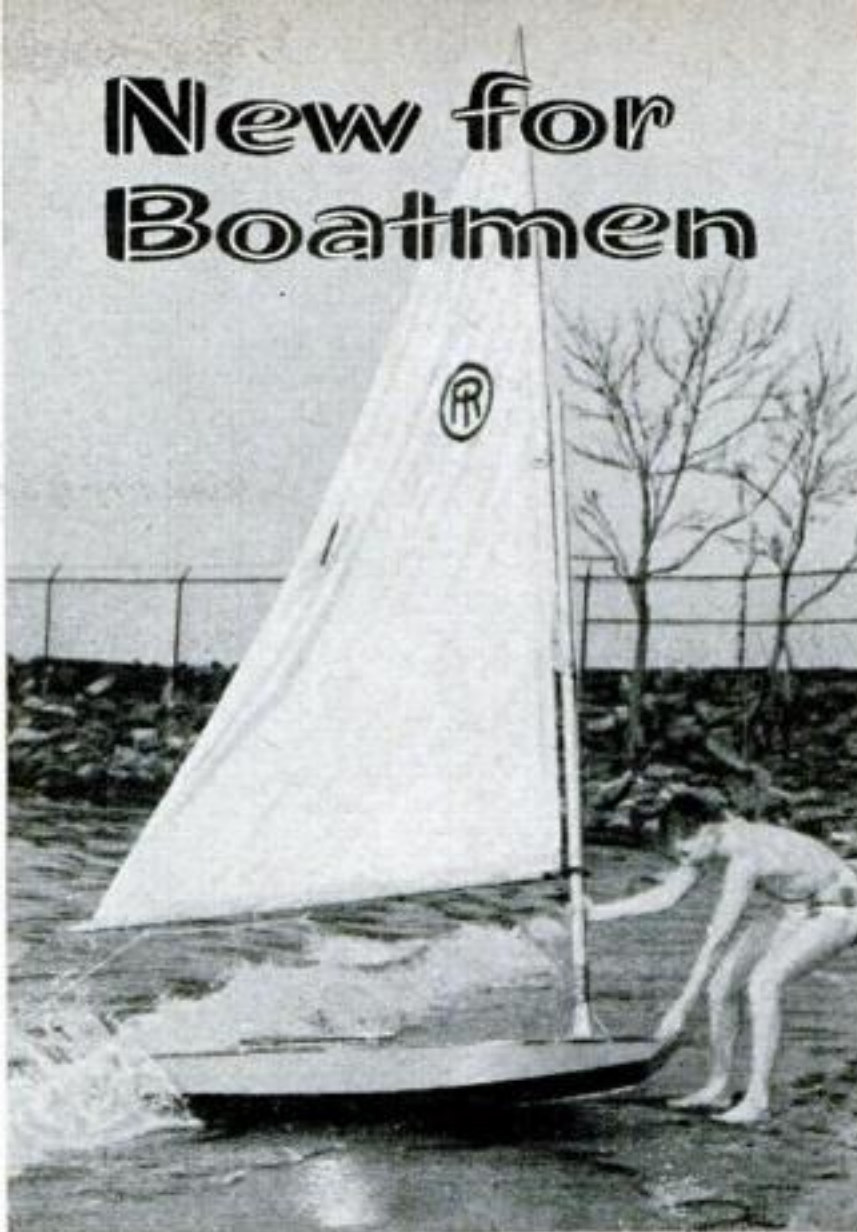
**2. Plug outmaneuvers weeds.** Wiggling a mouse-like tail, the Slo-Poke slips under lily pads and over weeds, snagging fish instead of itself. Pressure from below pushes the popper's movable hooks up toward the plug's body protecting the upturned barbs from tangling.

**4. Trolling-rod holder.** Both hands are free for handling the boat with a plastic clamp like this gripping the gunwale. After fishing you can lay the rod along the side of the boat out of the way. A cradle on the clamp's inboard side holds it in place. The clamp is attached to the boat without the use of screws.

**5. Speedy hydrofins.** You can make an outboard motorboat climb up and fly over waves like a hydrofoil. It is done with a conversion kit that comes in two forms: one you just assemble; the other is partly a make-it-yourself job.

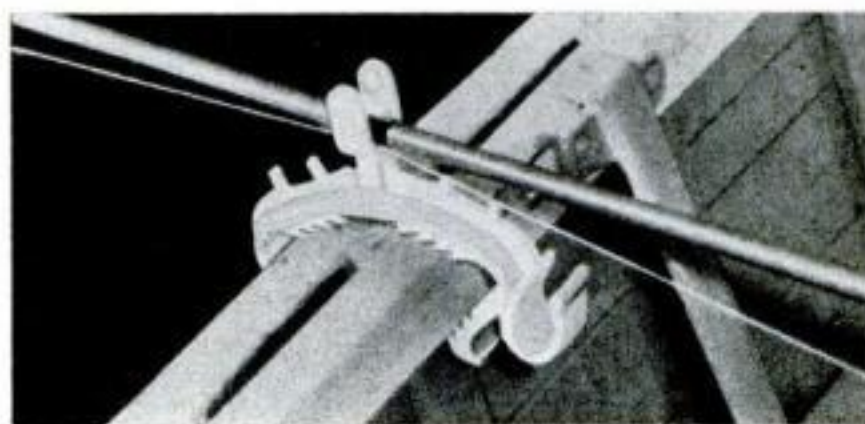


## New for Boatmen

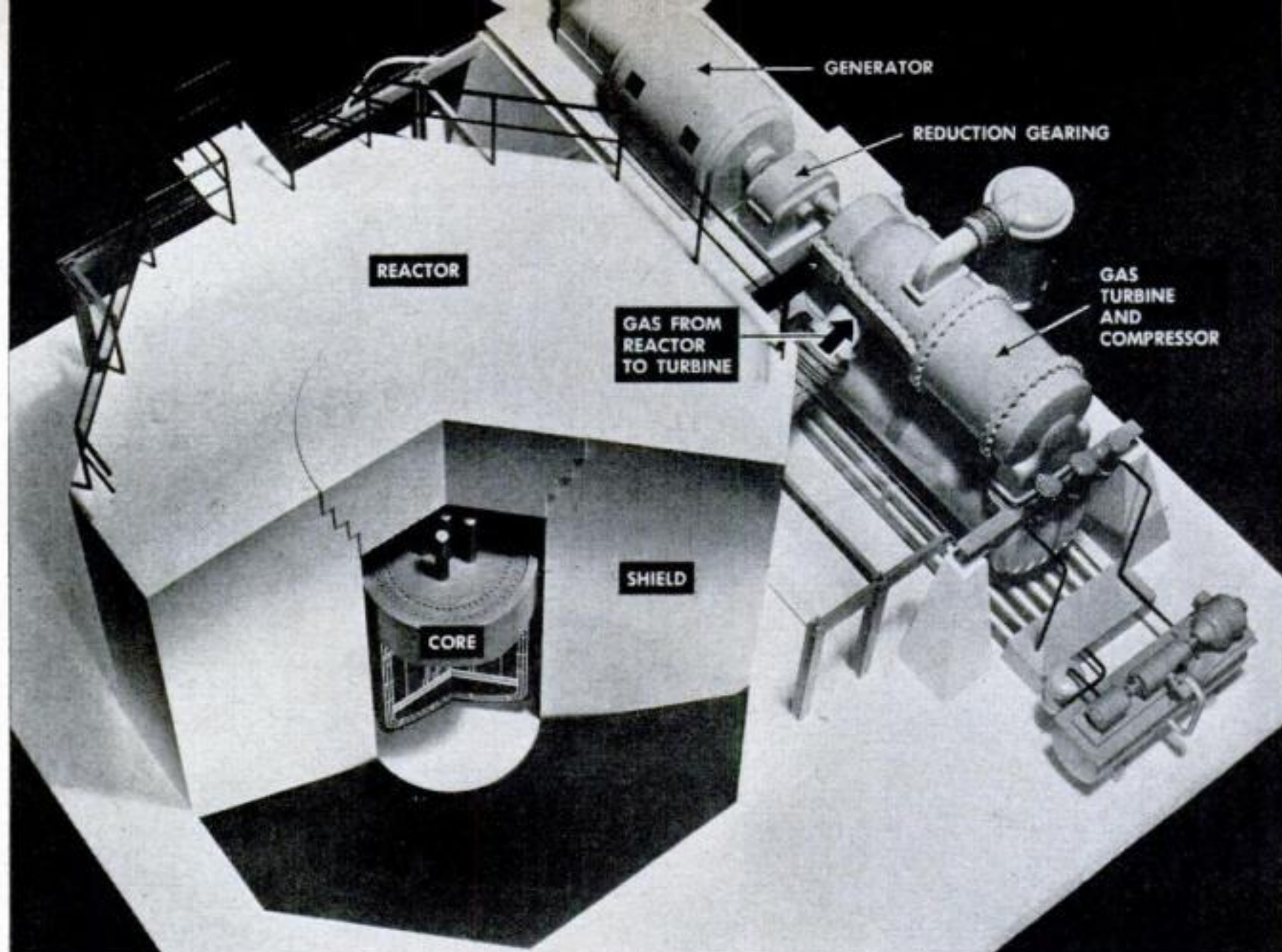


**3. Sailboat in kit.** A sail and center-board convert this paddleboard from hand to wind power. Or you can hitch on a speedboat for aquaplaning. The eight-foot Sinbad Aqua-Sled now comes in a kit as well as ready-made. It will support 300 pounds on its hollow hull.

*More information about these boating and fishing products can be obtained from: 1. Firestone Tire & Rubber Co., Akron, Ohio; 2. Barbee Bait Co., 228 Farmers Trust Bldg., Fort Wayne 2, Ind.; 3. Berkeley Models, Inc., West Hempstead, N.Y.; 4. P & K, Inc., 122 N. Dixie Hwy., Momence, Ill.; 5. Atlantic Hydrofin Corp., 601 S.W. Second Ave., Miami 36.*





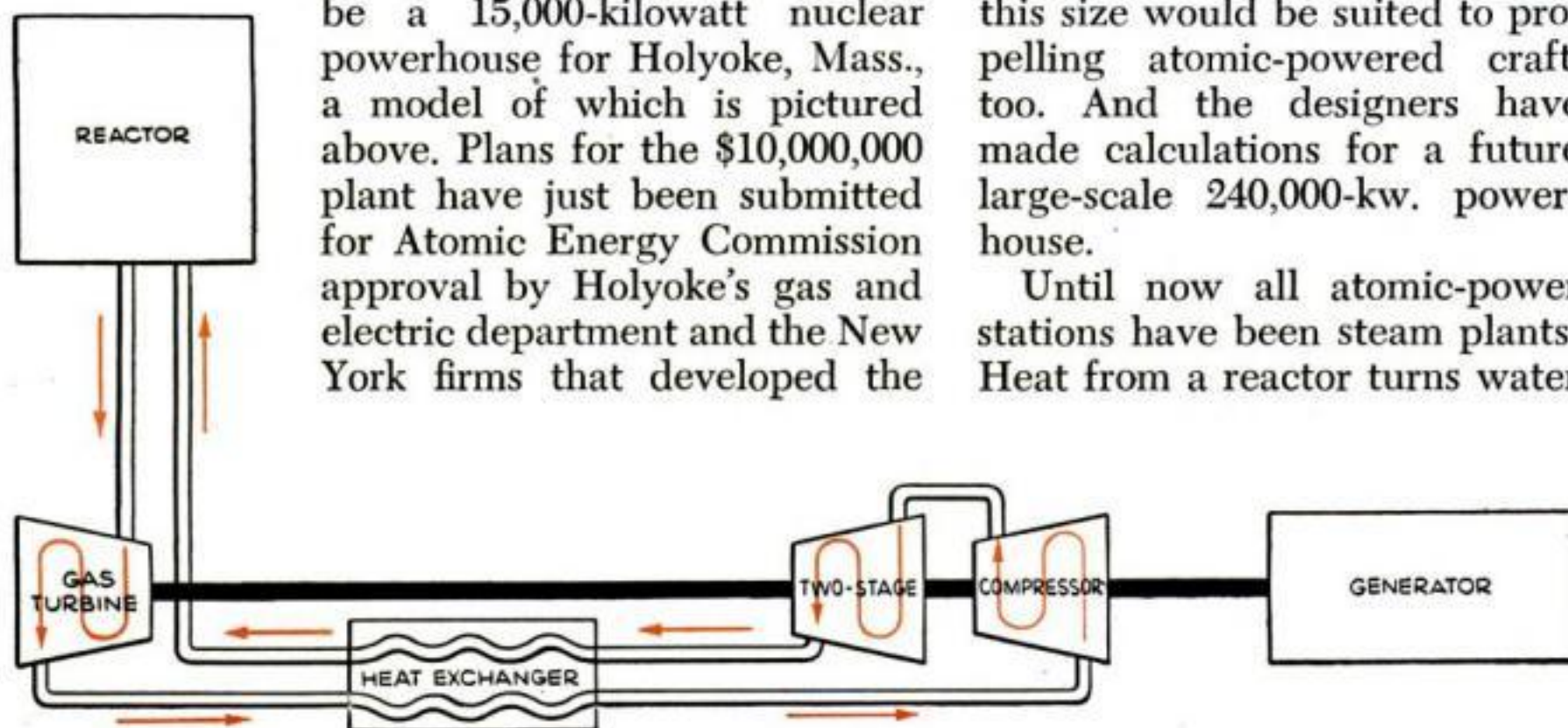


IN PROPOSED A-POWER STATION for Holyoke, Mass., a turbine will be driven with gas heated to 1,300 degrees in nuclear reactor. Housing be-

yond reactor holds turbine and two-stage compressor. Electric generator, in background at top of picture, delivers 15,000 kilowatts.

## Big Gas Turbine to Purr on Atomic Power

How the new power plant works



**D**RIVING a gas turbine promises an effective new way to harness atomic power. Pioneer installation would be a 15,000-kilowatt nuclear powerhouse for Holyoke, Mass., a model of which is pictured above. Plans for the \$10,000,000 plant have just been submitted for Atomic Energy Commission approval by Holyoke's gas and electric department and the New York firms that developed the

design: Ford Instrument Company, and Sanderson and Porter.

**Simple and compact**, a reactor-and-gas-turbine plant of this size would be suited to propelling atomic-powered craft, too. And the designers have made calculations for a future large-scale 240,000-kw. powerhouse.

Until now all atomic-power stations have been steam plants. Heat from a reactor turns water



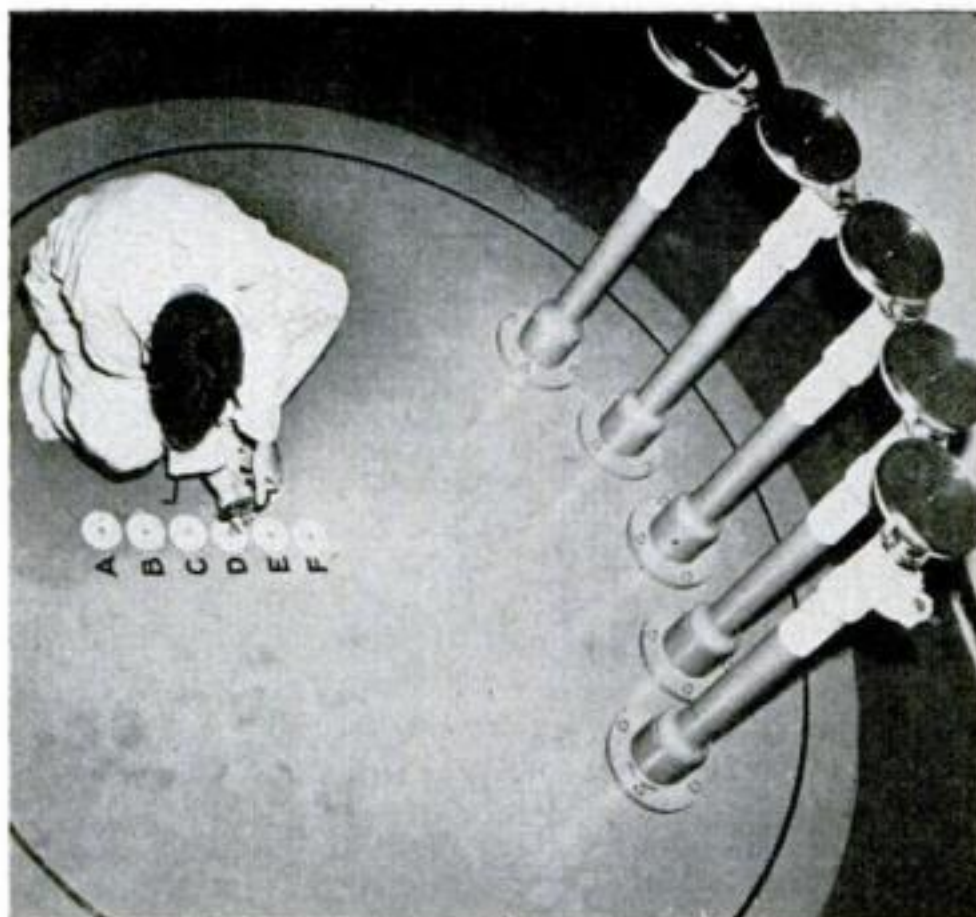
to steam and runs a steam turbine, coupled either to an electric generator—as in the 60,000-kw. atomic powerhouse nearing completion at Shippingport, Pa.—or, through reduction gearing, directly to a ship's propeller, as in the atomic submarines *Nautilus* and *Sea Wolf*. Usually the steam-making boiler is a separate unit, and the reactor's heat is carried to it by a circulating liquid or gas: pressurized water in the *Nautilus* and Shippingport plant, liquid sodium metal in the *Sea Wolf*, carbon dioxide gas in England's new Calder Hall A-power station.

**By substituting a gas turbine** for a steam turbine, the new design short-cuts this roundabout procedure. Driven by hot gas, the turbine is a large-scale counterpart of the small ones in aircraft jet engines.

Gas will be compressed, so that a given bulk will carry more heat energy, and then heated to about 1,300 degrees F. in the reactor. Rushing out, it will whirl the gas turbine. This spins the system's gas compressor and an electric generator, both coupled to the turbine. For ship propulsion, a propeller shaft would replace the generator.

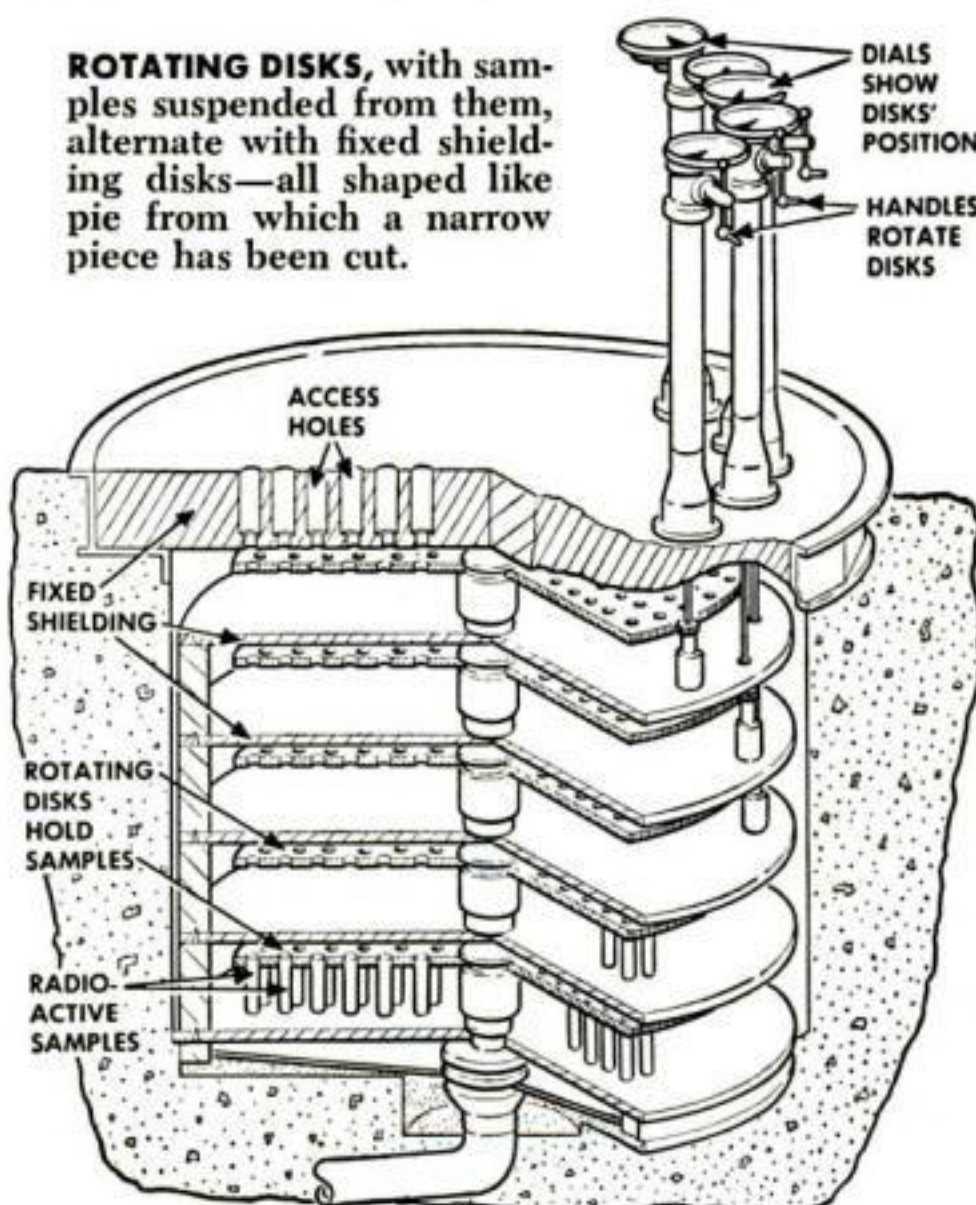
Gas from the turbine's exhaust will be captured and recirculated, as the simplified diagram at bottom left shows. This closed system prevents escape of radioactivity into the air. It also makes the turbine run quietly.

**A gas is needed** that is chemically inert, absorbs few neutrons and has favorable thermal properties. Nitrogen gas is the designers' tentative choice, with helium and carbon dioxide as possible alternatives. Novel materials may also include ceramic fuel rods, for heat resistance, instead of metal ones.



## Dial Safe Selects Hot Samples

THE world's "hottest" safe confines the radioactivity of 780 samples of canned and chain-reacted uranium, which it stores on rotating steel disks, at the Hanford, Wash., plutonium plant. Six lettered access holes, with removable plugs, pierce the top (photo above). By turning handwheels until dials show the right "combination," the technician above can align any wanted sample with one of the holes, and withdraw it with a clawlike implement.





# New Aids to Living



**1 Plastic trash can**, molded in one piece, is light, leak- and corrosion-proof. Available in six colors, the 10-gallon can is a handy catchall for trash from smaller wastebaskets. It comes with or without a lid.

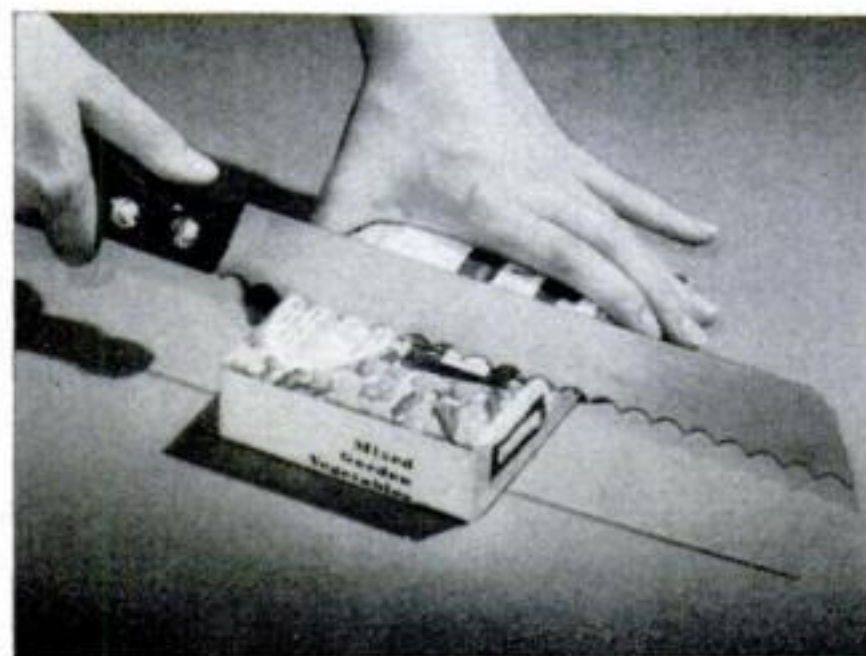


**2 Hot-cold picnic bag** has twin inner containers to keep food and drink chilled in one side from six to eight hours, and heated in the other four to six hours. Like the 21"-long outer container, they are made of durable plastic, insulated with fiber-glass. Textured to simulate basket-weave, the picnic bag comes in seven colors.

**3 Insulated tumblers** do triple duty. Each is actually two plastic glasses, doubling your supply in an emergency. When two are telescoped, the air between them keeps drinks hot or cold. Head-to-head, they become a shaker.



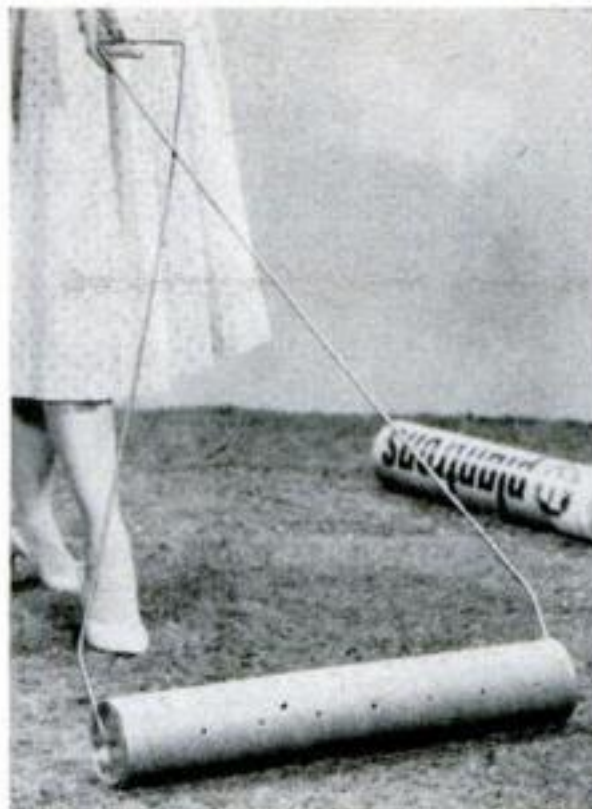
**4 Frozen-food knives** let you trim off only the amount of frozen food you want to defrost. Set consists of a coarse-toothed knife for vegetables and fruit (below), and a fine-toothed knife for meat. Worn blades can be replaced.







**5 Kitchen caddy**, made of clear plastic, holds 6"-by-5½" tabbed guides and filler cards for recipes and memorandums. A removable easel displays cards on top for hand-free reading. Brackets hold pencils.



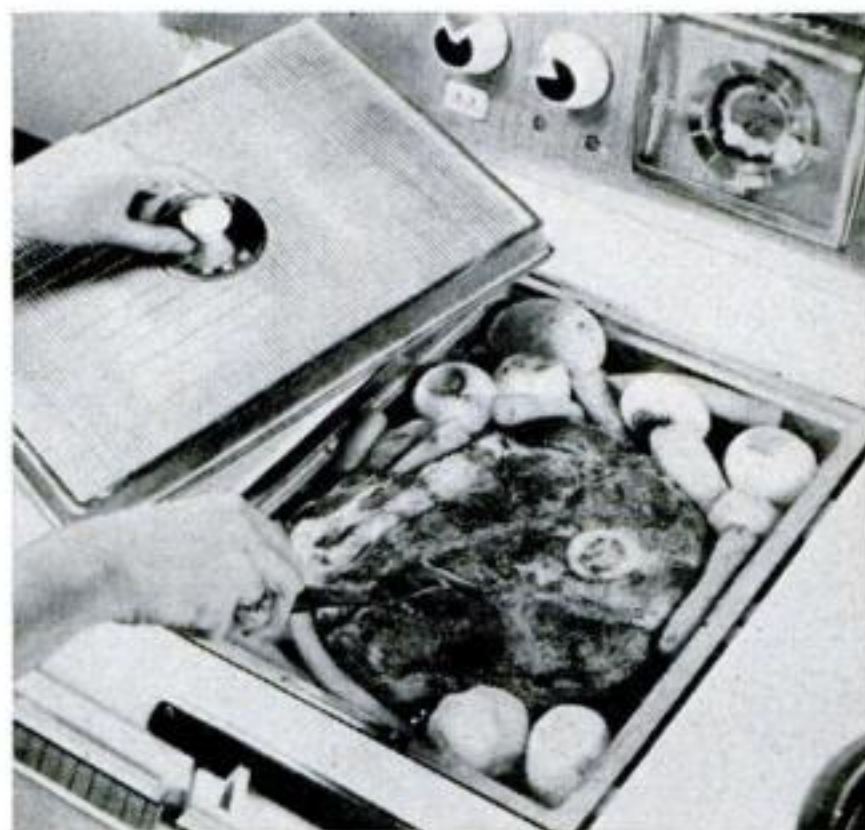
**6 Lawn spreader** is made by removing a paper sleeve from the perforated cardboard cylinder in which this new brand of pelletized fertilizer is marketed. For guiding, the manufacturer supplies a handle.



**7 Dripless dispenser** stops pouring after one teaspoonful of liquid has come out. Handy for measuring extracts, medicines and detergents, the plastic pourer fits bottles with 28-mm. threaded necks.



**8 Table-bench set** for four folds into a slim-wall cabinet when not in use (the benches become the doors). Made of steel, with Formica tops available in several colors, the set can be used indoors or out. Only four wood screws are needed to install it, except on masonry walls, where toggle bolts are used.

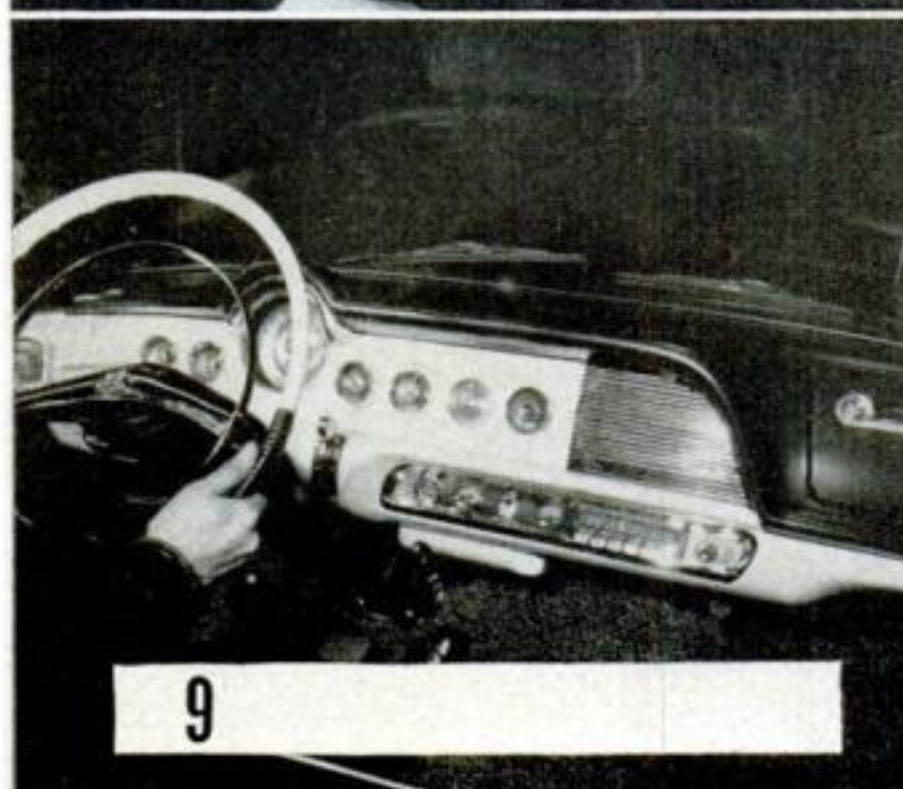


**9 Deep griddle**, with controlled heat, is a featured innovation in a new line of electric stoves. Described as a "kitchen work horse," it will fry, simmer, braise, bake, steam, French-fry and grill. There are two lids—a porcelain-enameled one fits flush with the stove; a domed lid is for roasts and baking.

More information about the products shown on these pages can be obtained from: 1. Loma Plastics, Inc., 3000 W. Pafford, P.O. Box 11277, Fort Worth, Texas; 2. Nappe Smith Mfg. Co., Farmingdale, N.J.; 3. Dorham, The Bosun's Locker, Box 212, Noroton Hts., Conn.; 4. Miller Falls Co., Greenfield, Mass.; 5. Flexi-Bin Corp., 6697 Olive St. Rd., St. Louis, Mo.; 6. Olin Mathieson Chemical Corp., 460 Park Ave., New York City 22; 7. Isle of View Co., 5550 Harcross Drive, Los Angeles 43; 8. Anco Window Corp., 2434 S. Harwood, Dallas, Texas; 9. Sears, Roebuck & Co., Chicago 7.



# What New Car Are You

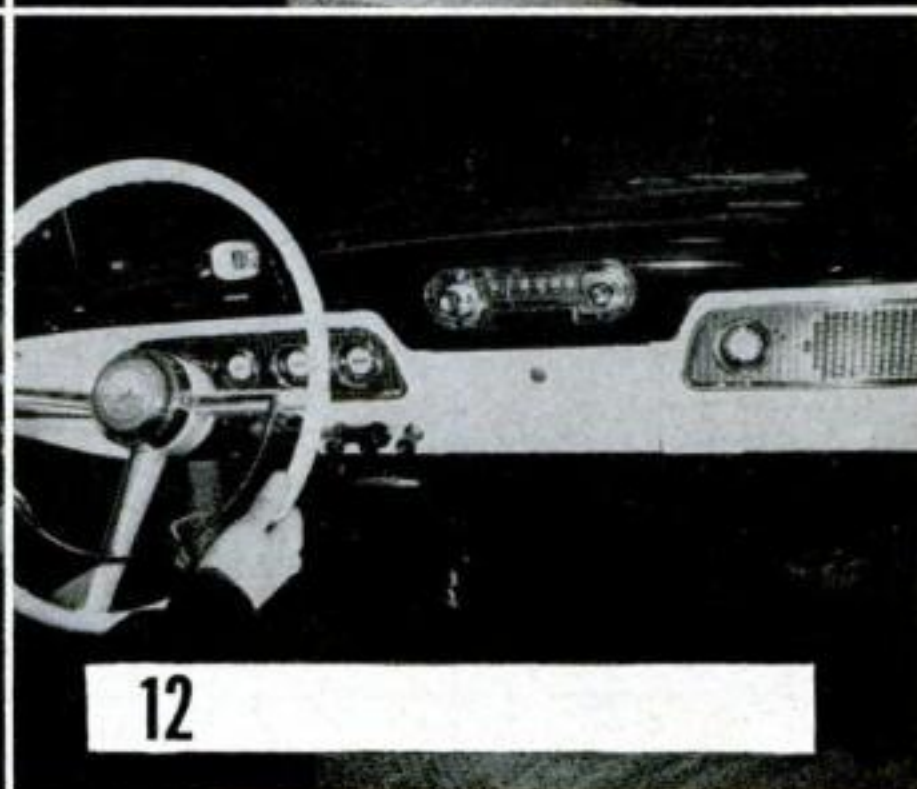
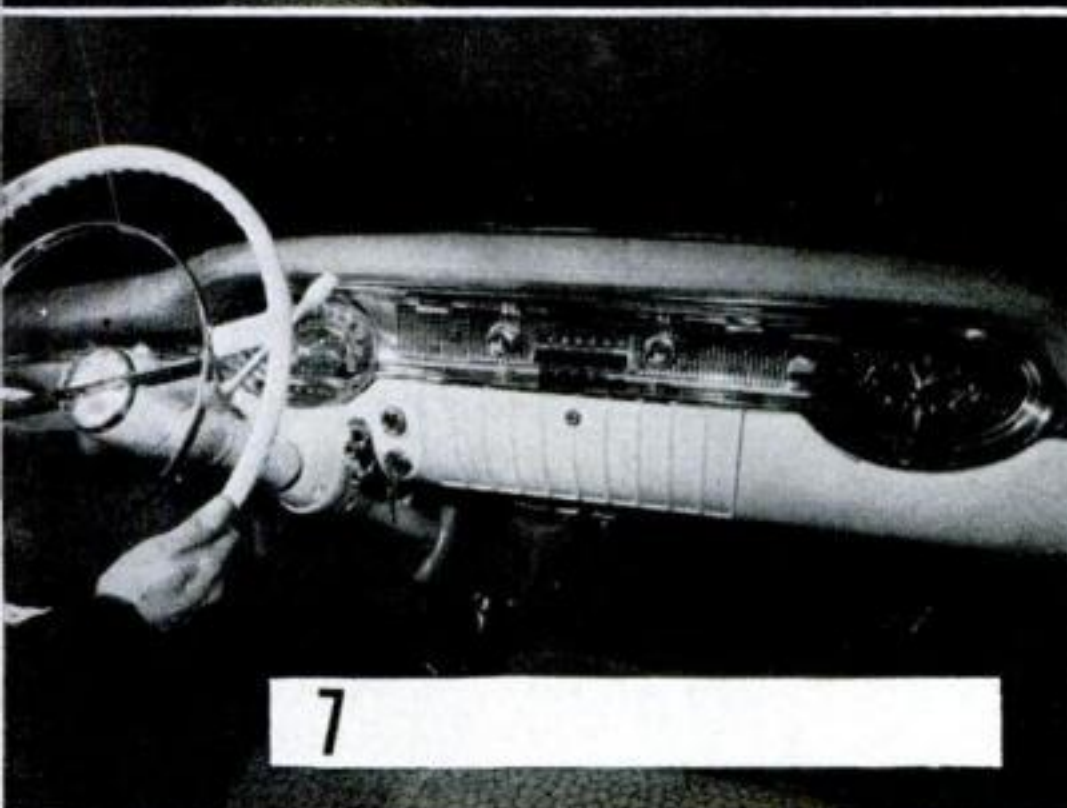
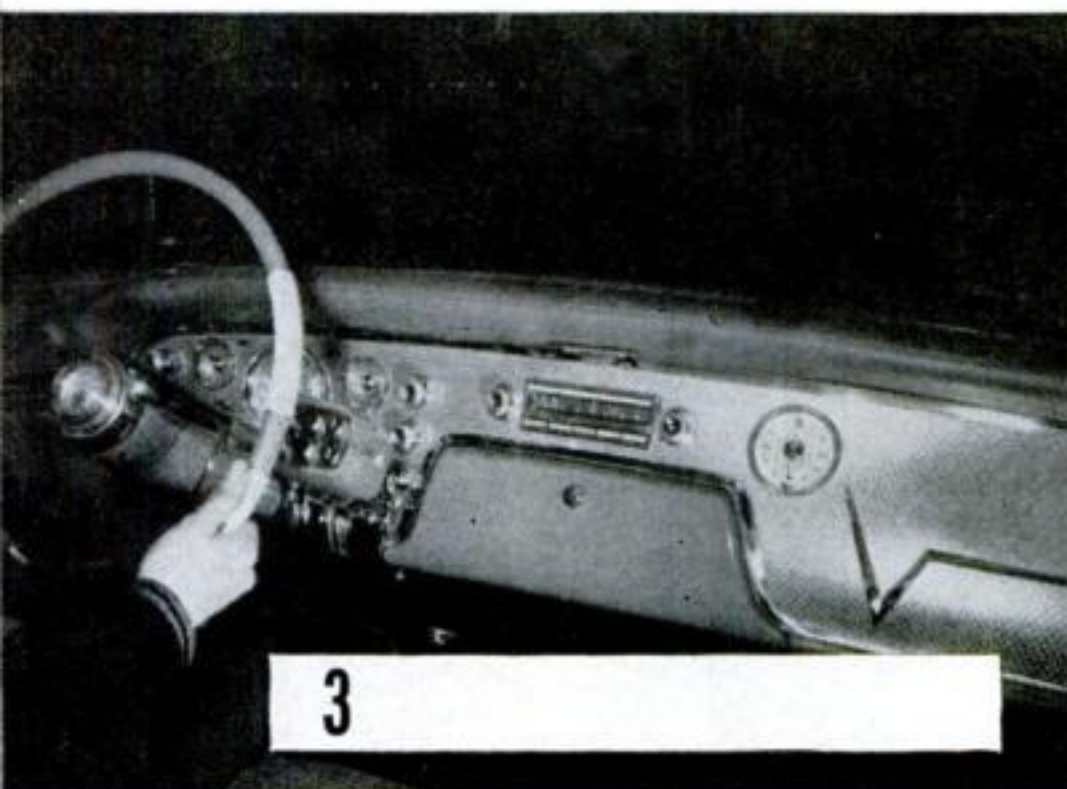


7. Oldsmobile; 8. Ford; 9. Dodge; 10. Cadillac; 11. Plymouth; 12. Studebaker.



# Driving?

THE pictures on these two pages put you in the driver's seat of a dozen 1956 U.S. cars. Which is which? Try to identify the make shown in each photo; then check your score with the answers that are printed upside-down across the bottom.



Answers: 1. Chrysler; 2. Chevrolet; 3. Packard; 4. Lincoln; 5. Mercury; 6. Nash;





### Emergency Unit Powers Home

WHEN power fails, you can roll this portable, 1,000-watt generator into the house and plug in lights, refrigerator, TV or other appliances. It is one of several new units that fit the Toro Power Handle. After the storm you can attach a pump that will bail out the cellar.



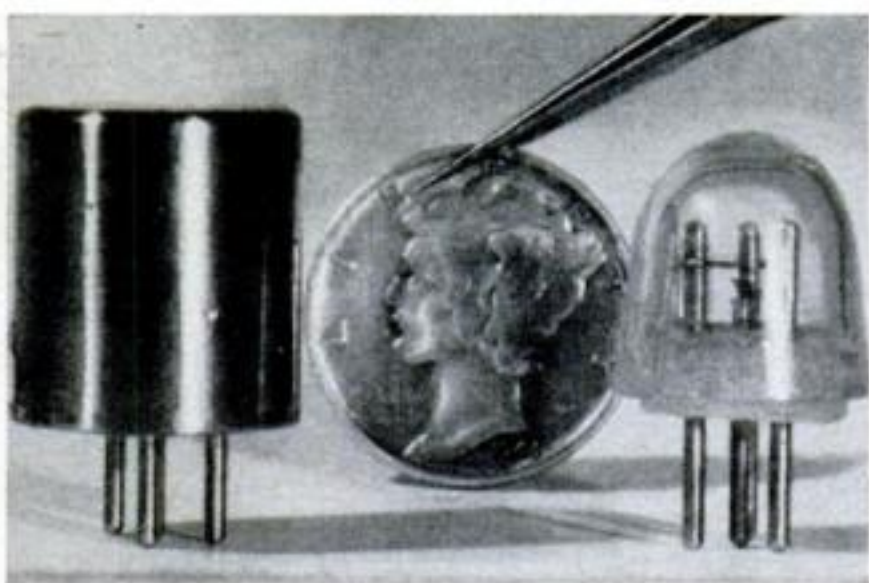
### Less Bounce to the Jounce

THE truck driver above is enjoying passenger-car comfort, says the Bostrom Mfg. Co. of Milwaukee. Since a truck can't have the same chassis suspension that a pleasure car has, Bostrom puts the suspension—rubber torsional springs—under its Level Ride seat instead.



### London Cabs Keep High Doors

THE outside radiator and open luggage rack are gone from this taxi introduced in London. Features include non-stooping doors and luxury seats for passengers, a closed-in section for the cabby, and a rear baggage compartment.



### New Transistors Are Dime-Size

A CHEMICAL layer 50 millionths of an inch thick is the heart of these new Bell test transistors, silicon (left) and germanium (right), shown compared to a dime. They can amplify 2,500 conversations at once on a telephone line.

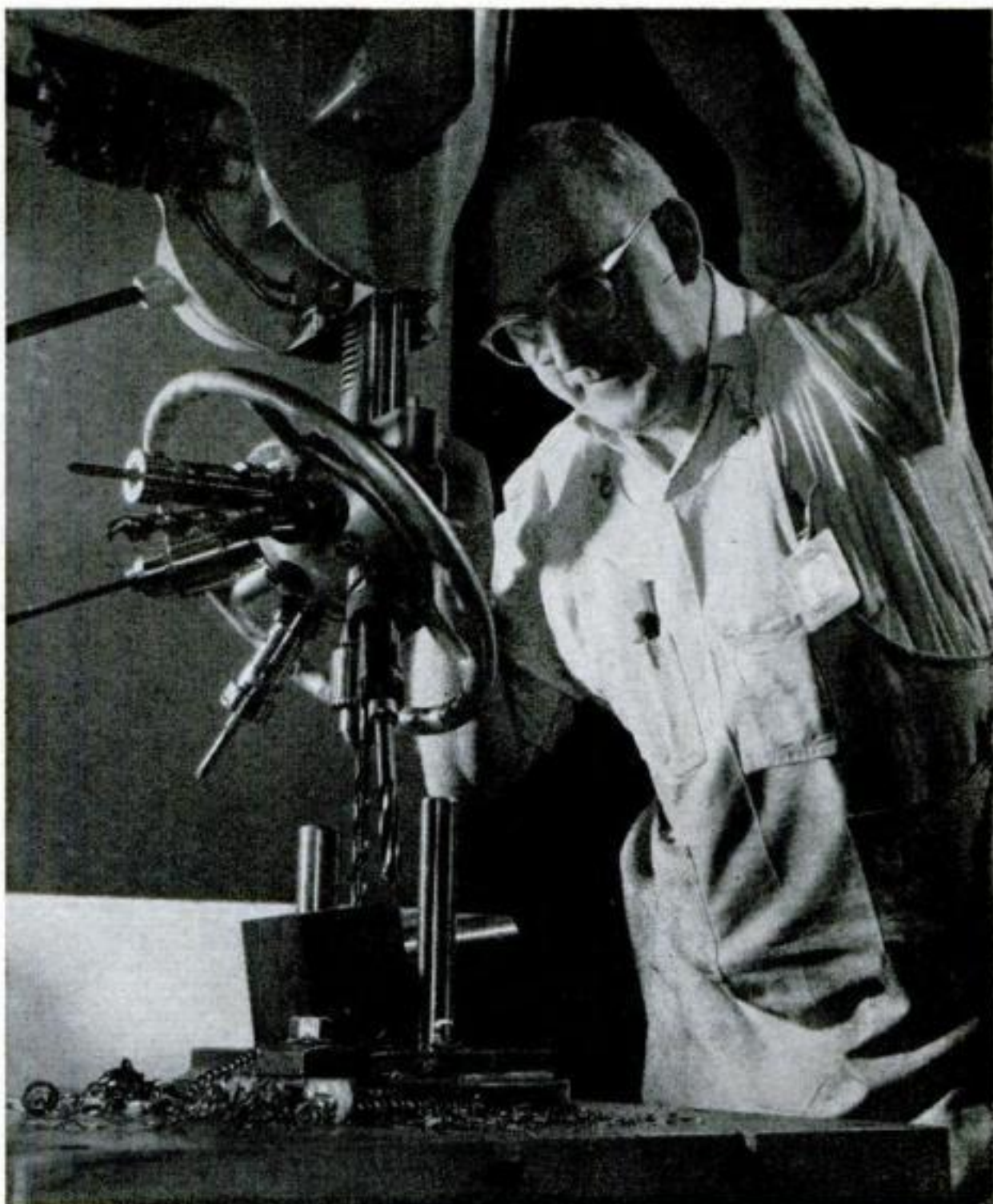


### **"Six-Shooter" Turret Drill Shifts Bits Fast**

SWITCHING from one operation to another is a simple steering-wheel twist with this multi-bit machine.

A drilling equivalent of a turret lathe, it was designed for drilling and tapping small projects where a variety of bores, counter-bores, threaded holes and other openings are needed in one piece of work. It can be run at speeds from 200 to 4,000 r.p.m. Depth stops are adjustable to .002 inch or less.

General Electric machinists use it on development parts for small-aircraft gas-turbine engines.

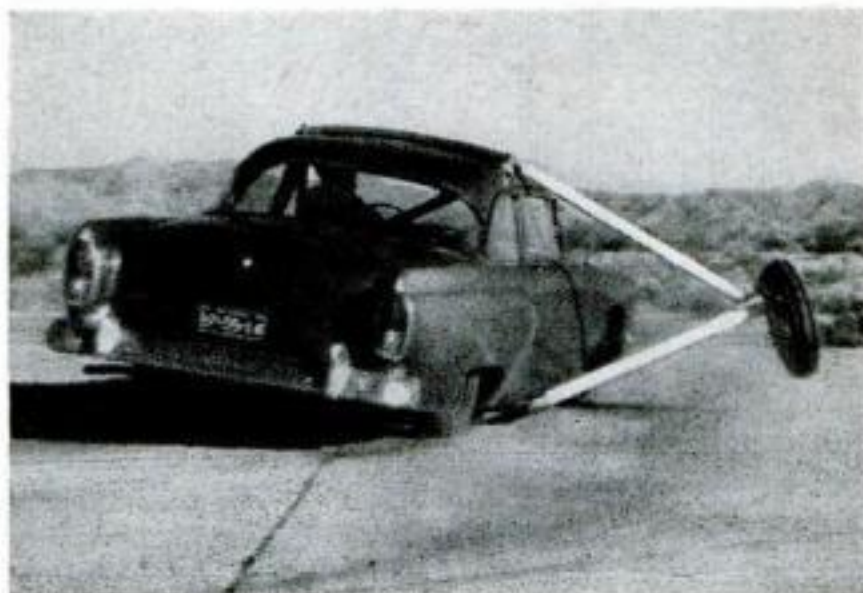


### **TV X-Rays a Child's Heart**

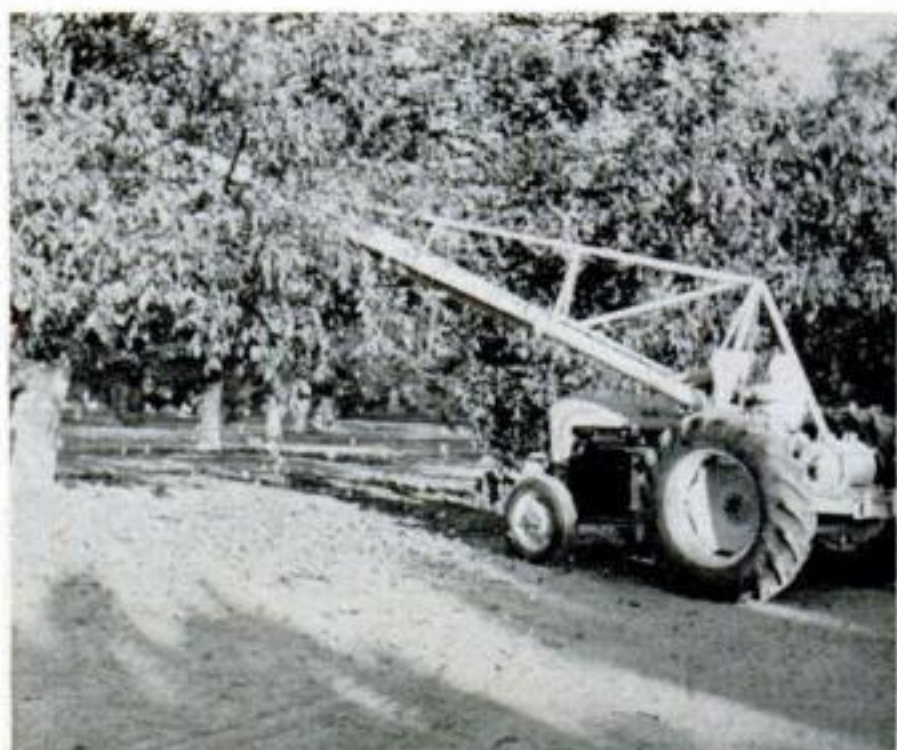
TELEVISION is helping doctors at the Cleveland Clinic to find the causes of congenital heart defects in infants and children. Combined with X-ray it gives them a large, clear picture of the pulsating heart for diagnosis in a well-lighted room. Dr. F. Mason Sones Jr., who supervised development of the setup, is shown here studying a child's heart.

### **"Fifth Wheel" Makes Car Tilt**

A NEW kind of "fifth wheel" is being used at the Ford company's Arizona proving ground. Shown on a test Mercury making a speed turn, the outrigger increases punishment to steering gear and tires. It serves the dual purpose of boosting imbalance in a turn and protecting the car if the left wheels leave the road. Standard "fifth wheels" ride behind for accurate speedometer readings.







**A BOOM 22 FEET LONG** (above left), with a steel hook on the end that turns 180 degrees and grips limbs up to eight inches thick, composes the tractor-mounted Best tree shaker. At right



a self-propelled Goodwin Pickup makes a clean sweep of the nut crop, after it has been shaken down, picking up the nuts with a seven-foot revolving rake and a conveyor belt.

## Bigger Farm Machines Reap Food on the Run

**F**RESH foods from fields and orchards now reach your tables faster and in better shape than ever before, thanks to machines that trim, wash, pack and load vegetables right where they are picked. These mechanical farmhands reach great arms across leafy rows to haul in melons, stretch hydraulic claws up into trees to shake down fruit, and whisk fallen prunes, figs or nuts off the

ground as neatly as vacuum cleaners.

Such machines have greatly speeded up the process of gathering crops and dispatching them to market. They also are taking the places of up to half of the live crews that once did the job.

Here, some of the more ingenious mechanical farmhands are shown on the job, helping to bring in California's \$500,-000,000 annual harvest.



**LIFTING ITS CLUMSY WINGS** at the end of a row, this self-propelled cucumber harvester gets ready to turn around. Six men, sheltered from the sun, lie prone on rubber pads along each

wing as the four-cylinder harvester crawls across a field. They pick cucumbers and drop them onto conveyor belts beneath the wings, which carry them centerward and into sacks.



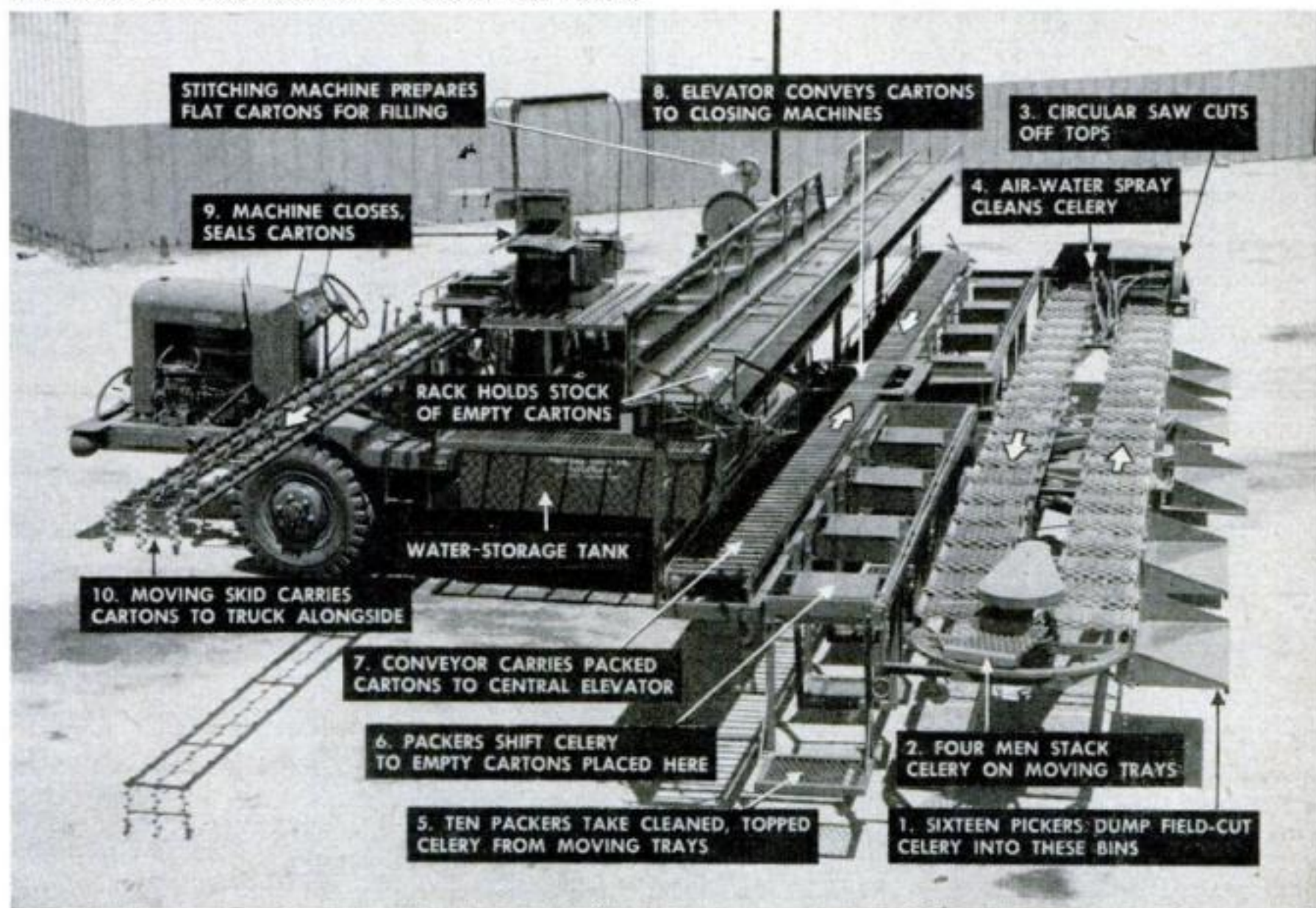


**GATHERING MELONS** in jig time, this Likens Loader, run by a four-cylinder Ford engine, keeps an 86-foot conveyor rolling across the path of a crew of fruit pickers as it creeps

sideways down a big patch on its four power-driven wheels. At the end of a day's work, the loader hauls in its conveyor, straightens its wheels and trundles off down the road.

**AT HOME ON MUD AND CONCRETE**, the special Fabco-Widetrak truck (right) moves through wet fields at 10 feet a minute with a load of 10 tons or more, does 60 m.p.h. on roads.

**500 CARTONS OF CELERY AN HOUR** can be readied for shipment by the Cochran Widetrak harvesting machine (below), which tops and cleans celery before passing it to packers. Conveyors carry packed cartons to closing machines and thence to a waiting truck. The harvester crawls one foot a minute in the fields but can fold its mechanical wings and do 40 m.p.h. on roads.





*"Of course there's no objection to your motor running right," Gus said mildly. "That's what I'm here for."*



# Gus Cools Off a Hot-Rodder

**By Martin Bunn**

**W**HEN Bob Tethrow drove his late-model car into the Model Garage with a flourish and a roar of dual exhaust pipes, Stan Hicks looked over at Gus Wilson with a wry expression.

"Hi, Gus," young Tethrow said.

Gus managed to keep from looking surprised as he moved forward, but his mind was busy. Gus was the chairman of the newly formed Traffic Safety Committee. Bob Tethrow, the only son of a wealthy and indulgent father, was inclined to be a wild and unpredictable driver. The Model Garage, Gus mused, was the last place he'd expect to see Bob Tethrow.

Bob was a well-set-up teen-ager, with a cocksure way about him, the look of an eagle in his dark, level eyes. Such a kid, Gus told himself, could become an army commander, president of the United States—or a gangster chief. He had that elusive quality that would cause other kids to follow his lead.

"Morning, Bob," Gus greeted him. "What's your trouble?"

"This crate cooks strictly on one burner," Tethrow announced. "It has the getaway of a wheelbarrow."

"I see," Gus said.

"Give her a tune-up," Tethrow said. "You know—the works on the motor. Or do you think that the members of the

Traffic Safety Committee might object?"

"Of course there's no objection to your motor running right," Gus said mildly. "That's what I'm here for."

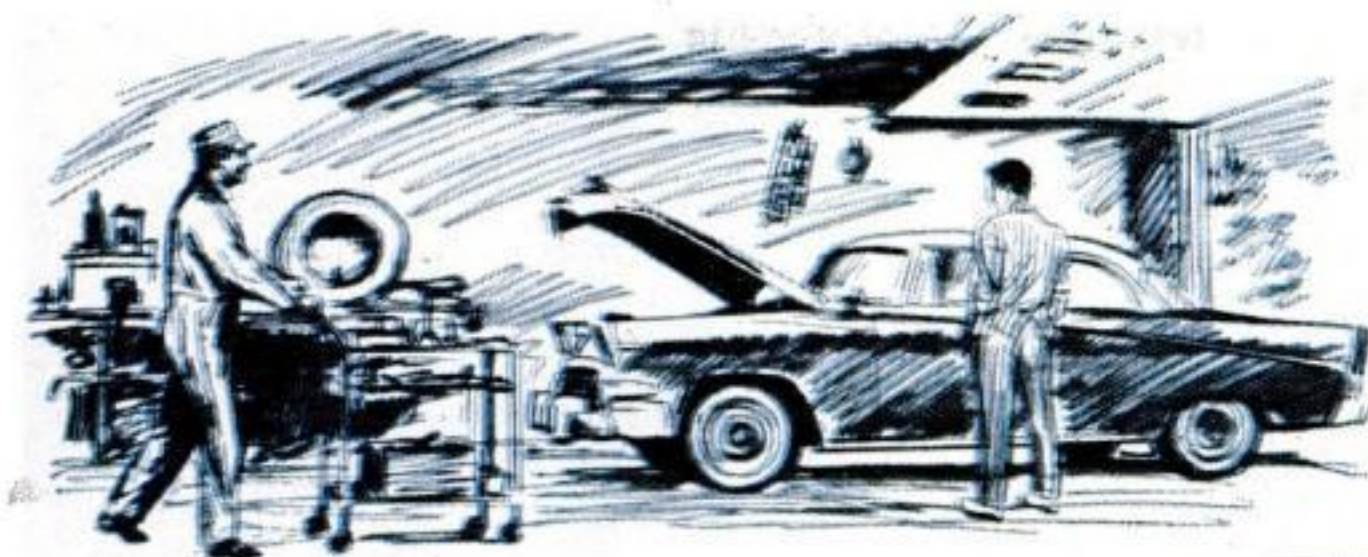
Gus opened the hood, cocked an ear to the exhaust, wiggled the throttle. A little rough, he thought. Kids like this wanted the last ounce of power and pep out of a motor. But why had he brought it to Gus? A wary look came into Gus's



*Gus sniffed sharply.*



**The Model Garageman had a double job: to speed up a reluctant car—and slow down its hasty owner.**



*Was something wrong with this rig, Gus wondered, that other mechanics had not been able to fix?*

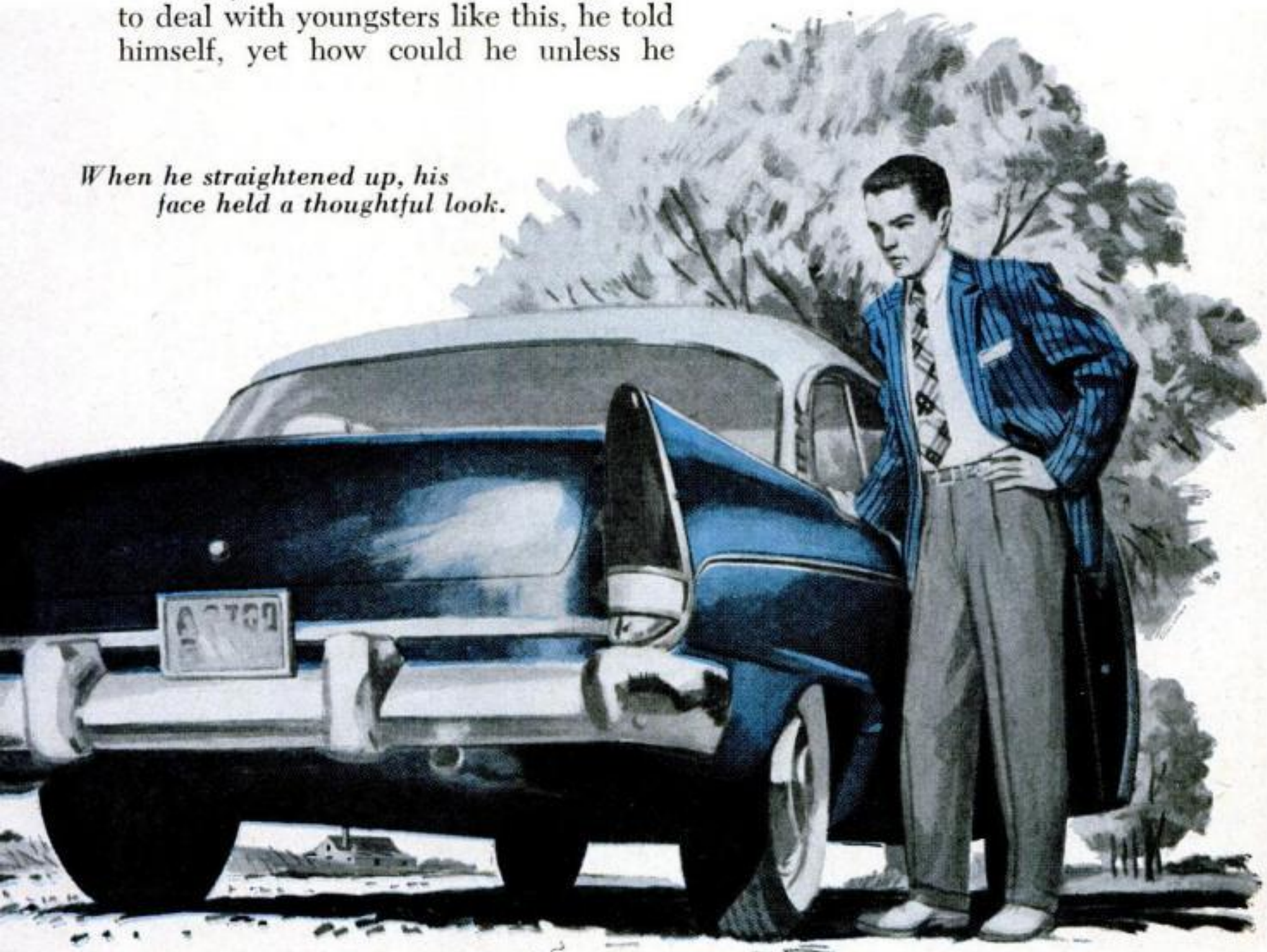
eyes. Was the youngster here to feel out Gus, as chairman of the Traffic Safety Committee? Or was there something wrong with this rig that other mechanics hadn't been able to remedy? Gus wheeled over his tool bench and went to work.

As he worked he thought of the Traffic Safety Committee. He was supposed to deal with youngsters like this, he told himself, yet how could he unless he



*The car ran sweetly until Gus tried to gun it from a stop. It wouldn't gun.*

*When he straightened up, his face held a thoughtful look.*





had their confidence? He could handle the adults, but could he reach a kid like this one?

"You graduate from high school this year, don't you, Bob?" Gus said, as he removed the air-cleaner and valve-assembly covers, tightened the cylinder-head studs to factory specifications.

"Yeah," Tethrow said. "What of it?"

"Going to college, I hear. What will you take up?"

"Engineering," Tethrow told him.

"Fine!" Gus said enthusiastically. "We need good engineers. I hope some of the other fellows will follow your lead in this, as they do in other things. They do, you know."

"They do what?" Bob asked. His eyes had a wary look.

GUS realized that he was treading on shaky ground. With his hands still busy, he turned his head to give young Tethrow a grin so warm and amiable that it would have disarmed the most suspicious of bobcats.

"There's always one fellow in every age group who's just naturally a leader," Gus said. "In my gang, when I was your age, it was Hank Scofield. If Hank liked sour apples, we all liked them."

"Yeah," Bob remarked drily. "So what?"

"Fortunately," Gus chuckled, preparing to make a compression test, "Hank led us in fairly safe places, and finally made up his mind to become a doctor. We hunted and fished and boated, but six doctors came out of our gang—good ones, too."

"Sort of a square, eh?" Bob commented. "This Hank character."

"Not at all," Gus assured him. "Hank was a regular guy. He never realized, mind you, that we were following his lead. Youngsters like that never do. Sort of a pity, seems to me."

"Why?" Bob's curiosity was aroused.

"Well," Gus said, digging out his pipe and lighting it, "there's a lot of unasked-for responsibility on the shoulders of a guy like that. If he manages to carry it in good shape, he should be able to sort of pat himself on the back. Take Hank, for instance. I'll bet that he doesn't realize to this day that he influenced the making of six doctors, and keeping my bunch out of trouble a good many times."

GUS concentrated on doing the best tune-up job he knew how. This kid, he thought, came in here to get a sweet motor, and I'm going to see that he gets it. Gus set the ignition for the hot gas he knew Bob was using, checked all connections, carburetor and fuel pump. He set the tappets with the motor at normal



"Frank, wouldja kindly turn off the mike while you're eating that celery!"

operating temperature.

"You didn't become a doctor yourself," Tethrow remarked.

"Didn't have the necessary to go to college," Gus told him ruefully. "But in a way, I guess, I'm still trying to follow Hank's lead. He turned out to be a crack surgeon, and I try to be as good a car doctor as he is on humans. Let's road-test this bus and see how she clicks."

The car ran sweetly until Gus pulled up at a stop sign and tried to gun her away. It wouldn't gun. Gus's eyes narrowed in concentration. Something, he thought, was holding this car back when it took off from a stop. Slow ignition? Couldn't be. He'd set it up and checked cam angle and automatic advance. Could it be the automatic choke? He'd checked that, but maybe the piston was sticking. Gus got out and took off the air cleaner. The choke stood wide open, as it should have with a hot engine. He replaced the cleaner, started the motor, accelerating it by hand from idle to quick pickup.

[Continued on page 242]





# Sprinkling a Lawn the Easy Way

By Paul Corey

**M**Y LAWN has a built-in shower bath. Tiny sprinklers, buried only a few inches below the soil, turn on a rainstorm at the twist of a faucet and I go back to my easy chair.

Once a millionaire's plaything, these permanent underground systems are now easy and inexpensive to install. They do a better job, too, because they put the water on evenly and all at one time.

If you have an odd-shaped flower bed or steep rock garden, you can also build in an above-ground sprinkling system custom-tailored to throw the water just where you want it.

**Going underground.** I chose a kit system that comes with underground hose and a choice of two, three or five spray nozzles already attached at the correct intervals. Each section has hose-type screw connectors at both ends that can be capped off or hooked to other



## How to install an underground system

sections to make any size or shape of system that you need.

You can also make up your own system, using regular plastic water pipe and separate spray nozzles. The pipe is sawed apart wherever you want a sprinkler to go, and a tee fitting is inserted. Short riser pipes are then screwed into the tees and topped off with brass or plastic spray heads.

**Burying the line.** Assemble the system completely, lay it out on the lawn, and test for any missed spots with the water turned on. Leave it on for a while; a well-soaked lawn is easier to cut into.

There's really no digging to it. You just slice a thin slit with a spade and press the sprinkler line into it. The line should lie low enough to bring each spray head flush with the sod.

Start at the house to make sure that you have enough slack to connect to the faucet and work outward, burying about three feet at a time. Tamp the sod back over it, and in a few days you'll never know that the lawn was cut.

**Tunneling under.** You can snake your lines right under narrow obstructions such as walks and small walls. Cut out a 2'-wide patch of sod and lay it aside intact for replacement later. Then dig down a foot or so until you can either break through with a shovel or drive a pipe through.

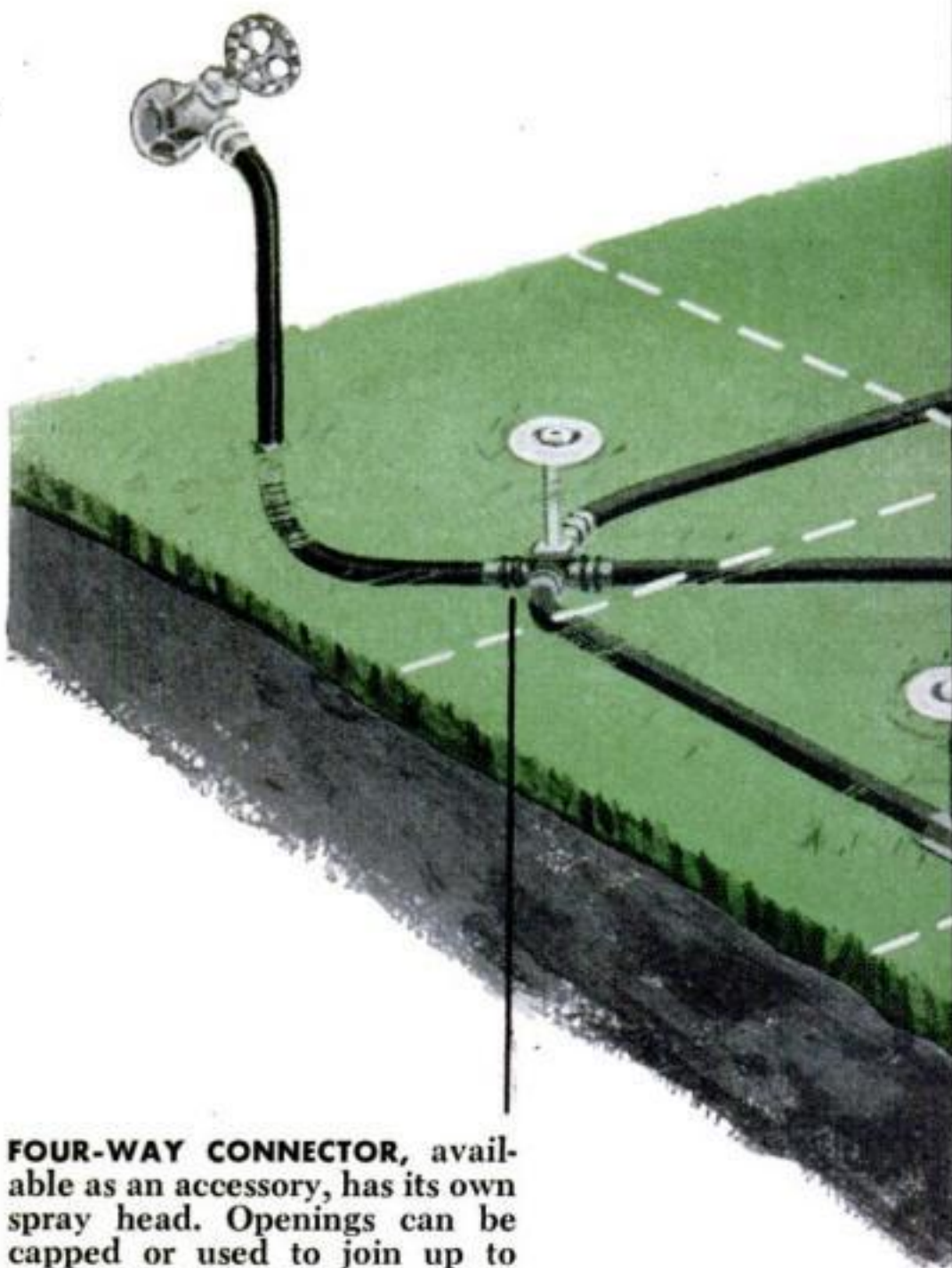
Don't try to submarine a large obstruction like a driveway—divide your system into two or more sections. If there's only one sill cock, you may be able to run the second line around the house to reach it or in through a basement window to a washtub faucet.

In a pinch, just let the line end in a capped riser, which you can then connect to the house with a short above-ground hose when you need it.

**Check your pressure.** If your water pressure is low or your system is large, you may also have to split the line into separate sections and run one at a time



**SPRINKLER KITS** come with underground hose and spray heads already attached. Before you buy one, make a map to show where the sprinklers will go. Divide the lawn into 12' squares and mark the center of each to indicate a spray head. Spray circles cover about 20', so that 12' spacing insures a good overlap of water.



**FOUR-WAY CONNECTOR**, available as an accessory, has its own spray head. Openings can be capped or used to join up to three sprinkler lines, with a fourth feeder line from house.

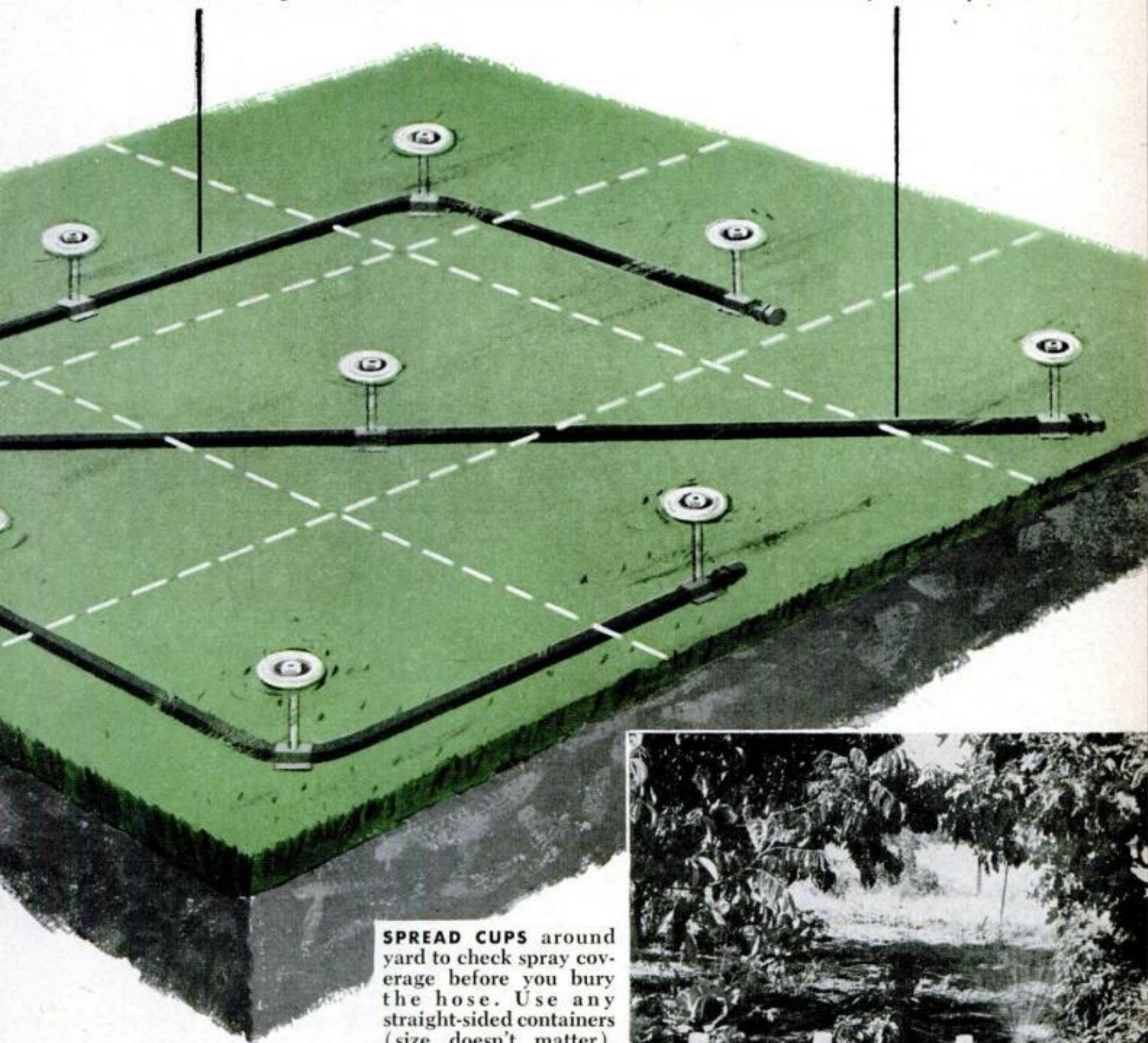






**NO TRENCH TO DIG.** Just push spade in 6" to 8" deep, lever it back and forth to widen the crack, and drop in the line. Tamp it down firmly with a board and press the sod back over slit.

**EXTRA LENGTHS** are screwed on as you need them with hose-type connectors. Sections are available with two, three or five sprinkler heads and can be combined for any number you want.



**SPREAD CUPS** around yard to check spray coverage before you bury the hose. Use any straight-sided containers (size doesn't matter), such as pans or tin cans.





## How to make a flower-bed sprinkler

to obtain a sufficient volume of water.

Usually, 30 pounds' pressure will operate from six to eight sprays; 60 pounds, from nine to 15 sprays. If you're not sure what your pressure is, you can have the water company or a plumber tell you.

Special two- and three-way connectors are available with diverter valves that will enable you to operate several lines separately or all at once.

Some local codes require an anti-back-flow valve to keep lawn water (which may be contaminated) from seeping back into the house system. This should be connected into the line just ahead of the sill cock. Code or not, it's a good idea to add one if your system runs near a septic tank or other trouble spot.

**Spraying a garden.** Here I used plastic pipe, running it around the edge of the bed above ground. Tiny holes punched in the side throw fine streams of water inward without wetting the terrace. Staked firmly to the ground, the pipe can't move or twist, and it saves me from lugging out a hose every time the flowers need a drink.


Low pressure may also become a problem here if your system runs to more than 50' of pipe. If so, you can split it into sections with the same fittings used for the underground systems.

**How much water?** You can avoid oversoaking your lawn or not giving it enough by making a simple test. Scatter several pans or trays around the yard and see how long it takes to collect 1" of water. This is equal to soaking the ground about 6" to 8" deep, which is the amount that most soils need once a week. (Put *all* of the water on at one time—thinly soaked soils cause roots to turn upward in search of water.)


Once you know how long to run your system, you can turn it on and forget it. With an inexpensive timer shut-off valve hooked to your faucet, you can even head for the movies or go to bed and never give it another thought.



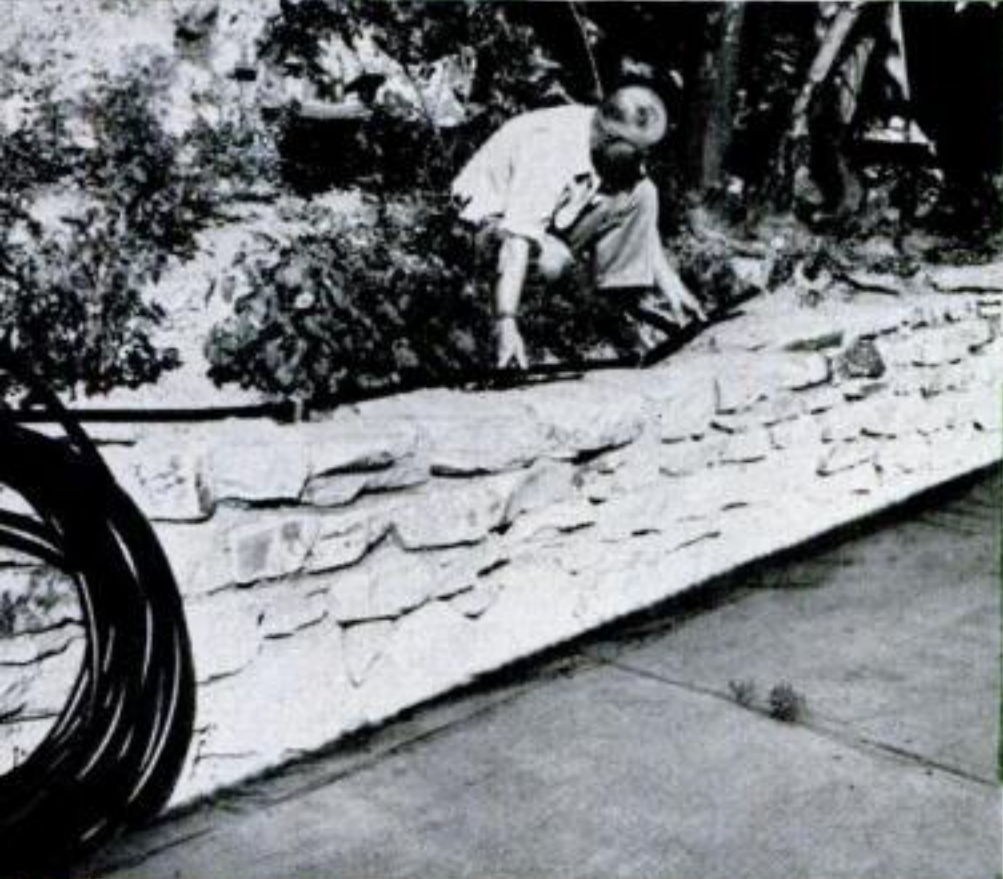





**PRICK SPRAY HOLES** every few inches with water on so that you can aim the jets. Use a large needle or icepick. If you make the hole too big, seal it with plastic electrical tape.



**SPRINKLER PIPE** follows outline of garden, makes it easy to put water where you want it without trampling flowers or wetting other areas. A clamp-on cap seals the end of the pipe.



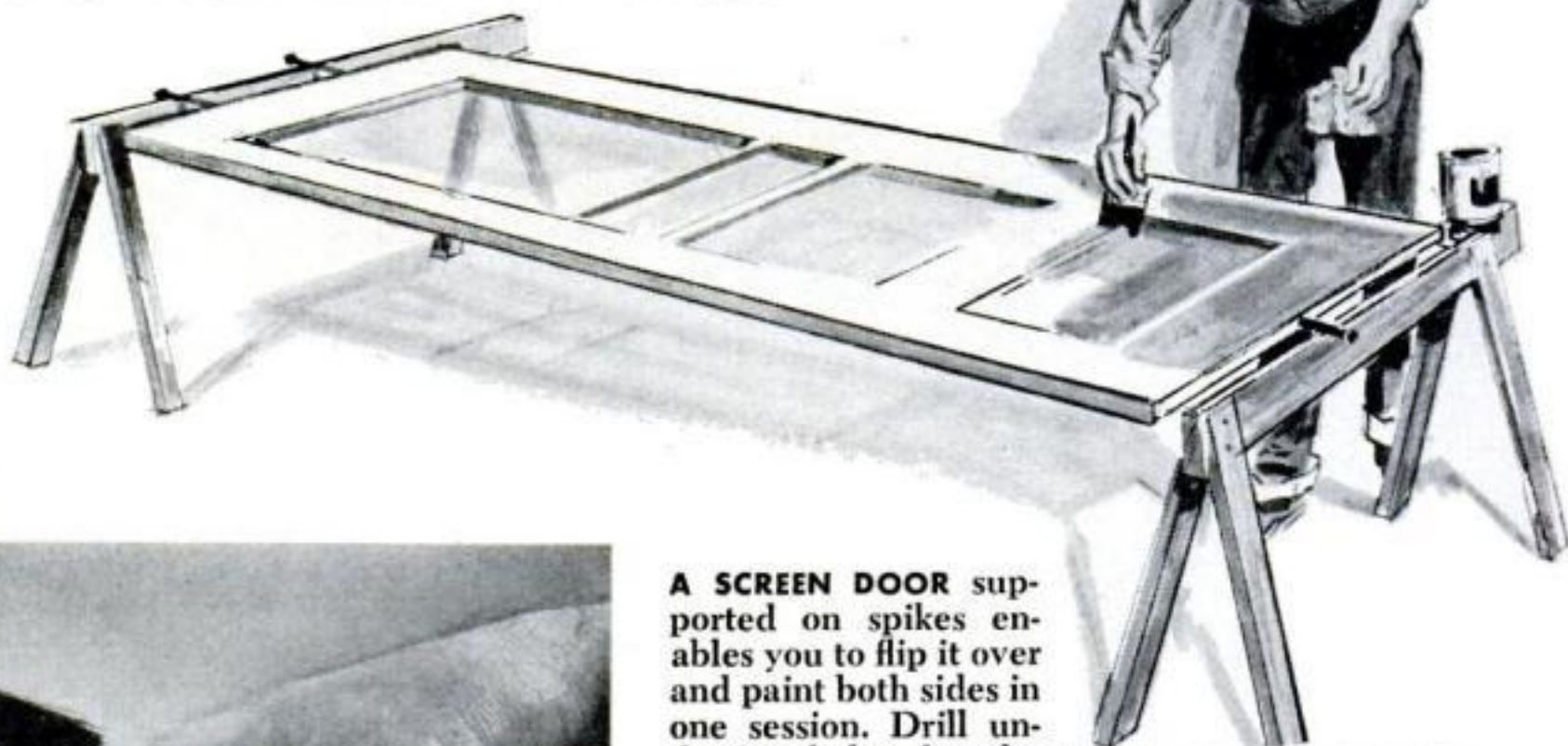
**STAKES ARE DRIVEN** part way in around edge of bed at 4' intervals. The pipe is then threaded through the holes, and stakes are later pounded in tight to keep the pipe from twisting.



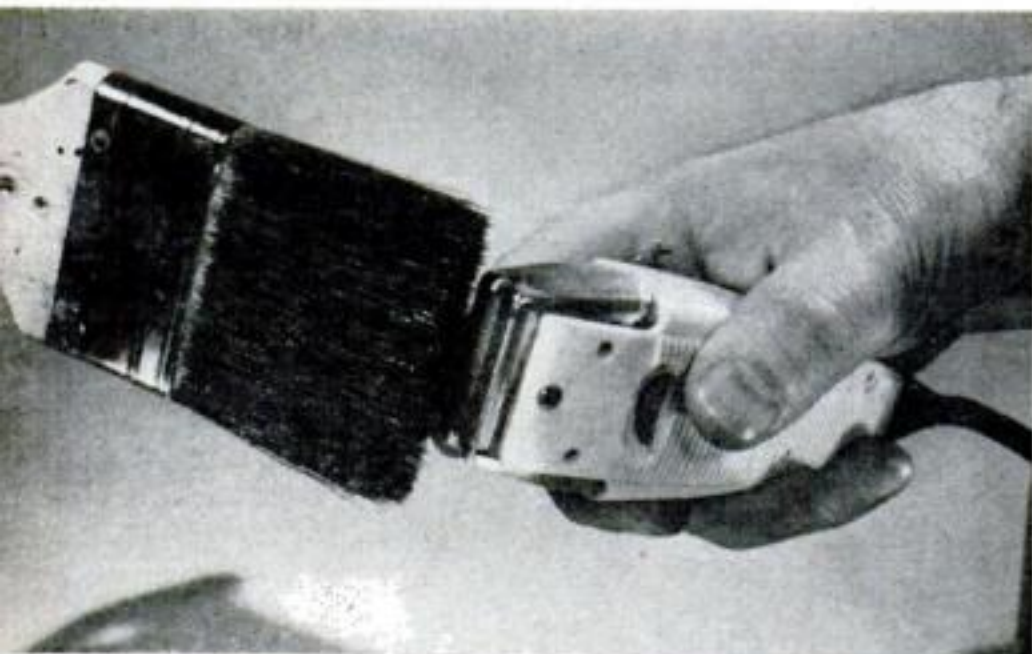
**SHARP CORNERS** can be turned by cutting pipe and inserting a rigid-plastic elbow, held on by hose clamps. The pipe bends to gentle curves without angle fittings. **END**



# 7 TIPS FOR THE Painter

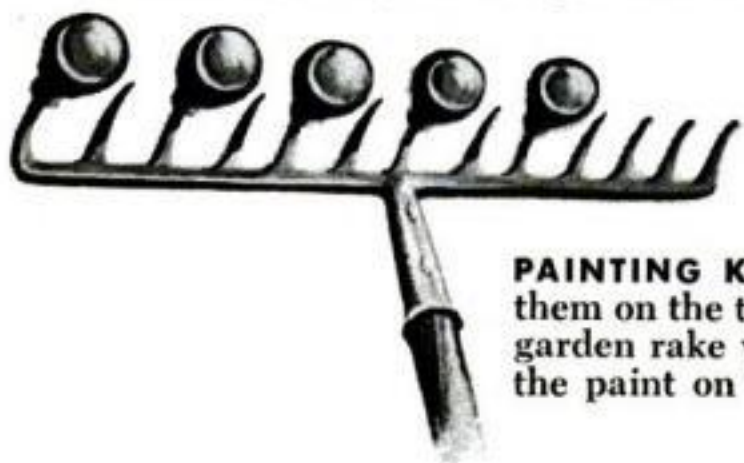


**A SCREEN DOOR** supported on spikes enables you to flip it over and paint both sides in one session. Drill undersize holes for the spikes, plug them up later with some putty.



**RESHAPE A WORN BRUSH** with an electric shaver, using a new brush of the same type as a pattern. Besides trimming the working end, the shaver quickly cuts stray or bent bristles.

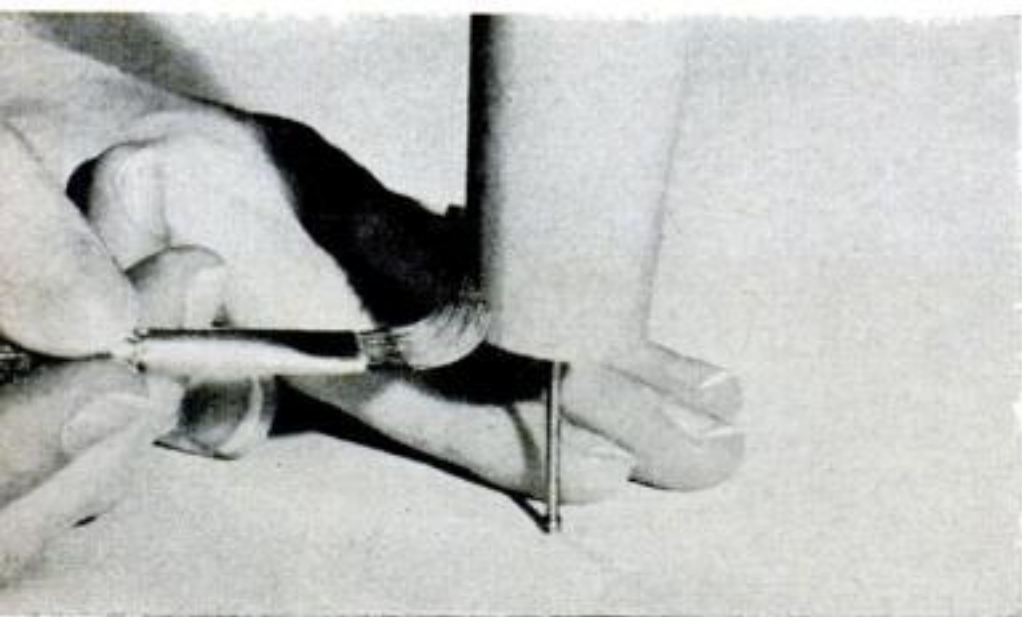
**SALVAGE SOLVENT** for re-use after you have cleaned your brushes. Let the sludge settle. Then carefully drill a hole in the can just above sludge level. Catch in a second can.



**PAINTING KNOBS?** Stick them on the tines of an iron garden rake while you dab the paint on them.

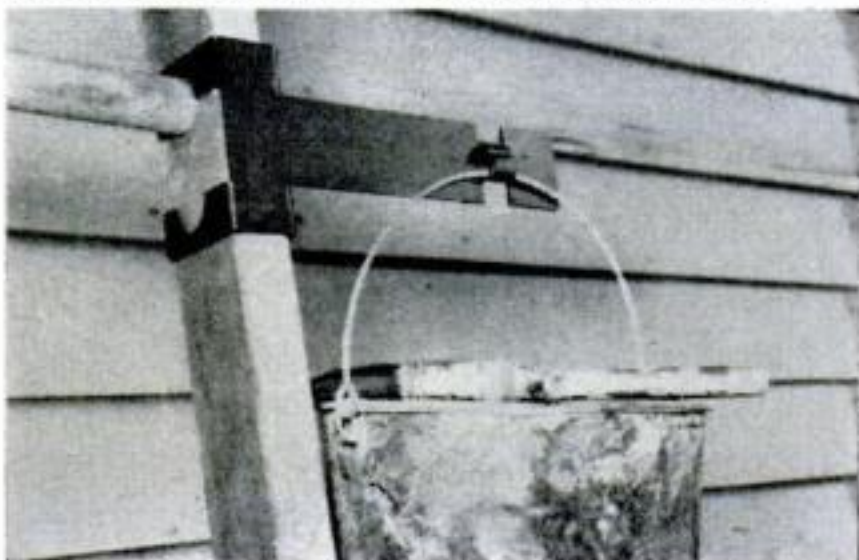


**KEEP PAINT SKIN-FREE** when you leave it overnight by easing solvent over the surface with a spoon bent like a ladle. Close can gently. Stir in floating solvent the next day.



**DRIVE A NAIL** into the bottom of each leg like this before you start painting a table or chair.

**A HANGER** for the paint container is convenient when you're working on a ladder. Bend it from sheet metal so that it clips on one side of the ladder and hooks over an adjoining rung.







# How to Replace Broken Sash Cords

**Do your windows fall down on the job? Are they hard to open and close? It's easy to give them a brand-new lift.**

**By Bob Gilmore**

**C**OPING with windows that fight you every time you move them, or that have to be propped up, is harder than replacing the broken cords.

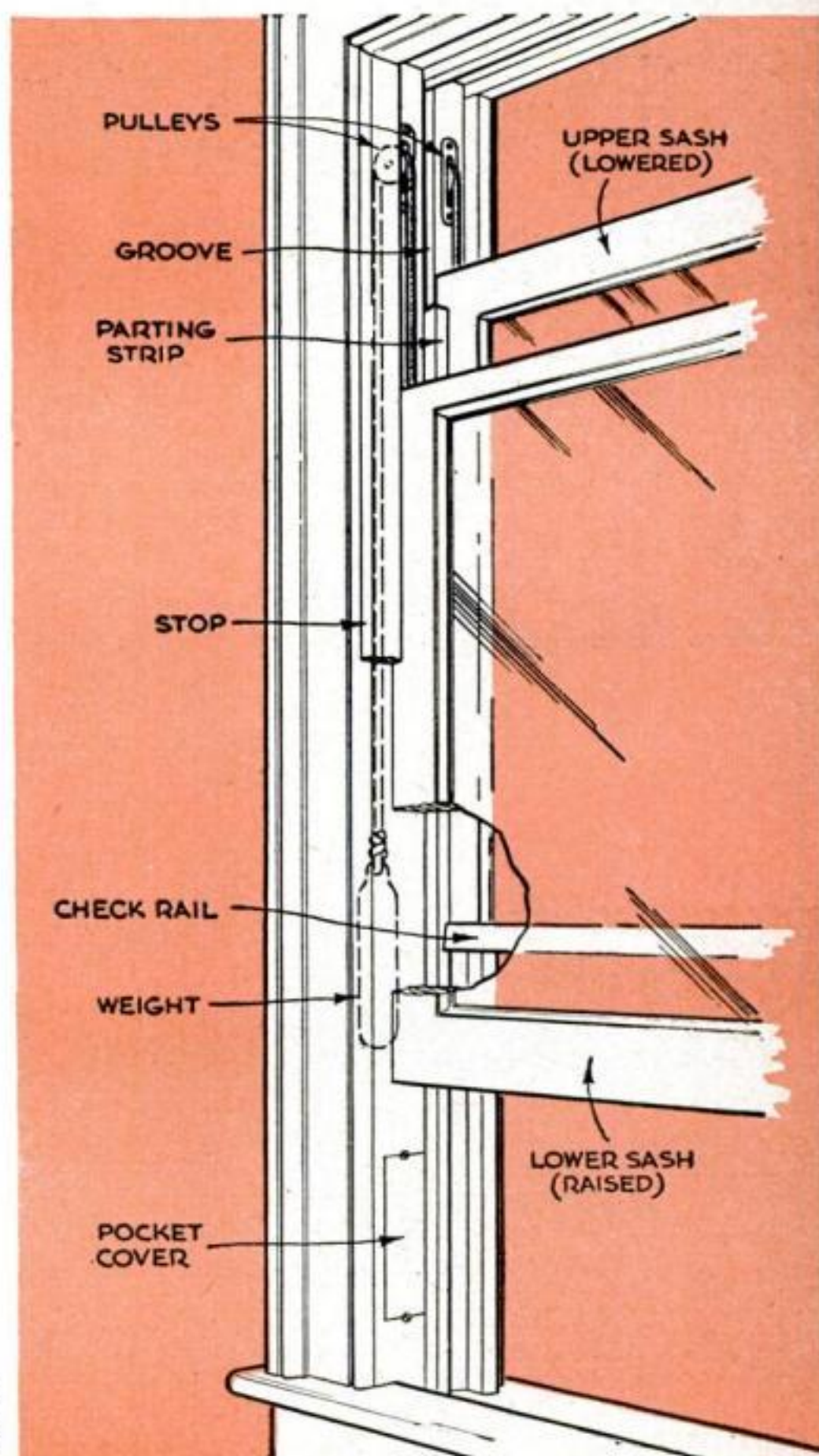
The job requires only simple tools. Follow the steps on the next two pages. You may want to use sash chain instead of cord. It costs a little more, but goes in easier and lasts longer.

Or you may wish to do away with cords and weights by installing spring balances. Some go where the pulleys now are; others, as in the photos on page 178, go midway in the window frame.

**Troubles and cures.** When wood sashes or frames have shrunk so much that windows rattle, interlocking spring weatherstrip applied both to the sash edges and the channel face is the best cure. Another is a strip of plastic counter-top material, fastened to one edge of the sash with contact cement. You may stop rattles in the inside sash by moving the stop strip closer.

Double-hung metal sashes sometimes chatter as you raise or lower them. This is usually due to unequal tension on the spring balances. Unwind them with a screwdriver or special tension tool and rewind each an equal number of turns.

**WEIGHTS INSIDE THE FRAME** counterbalance double-hung sash. When cords break, the weights fall to bottom of the pockets.

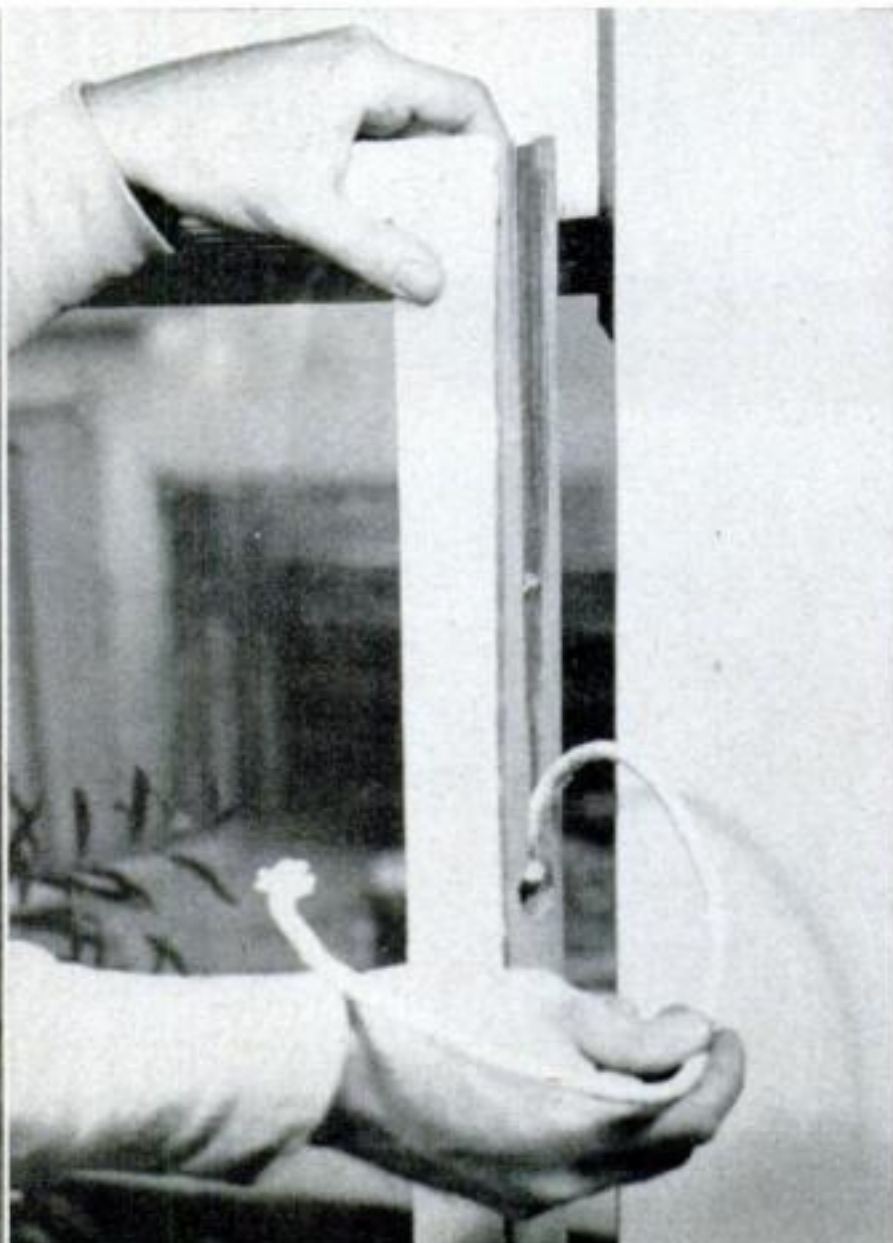




**Follow these steps to replace cords or substitute chain**



**1 REMOVE STOP STRIP** at side where cord is broken, sliding sash out of the way to use a wide chisel, putty knife or claw hammer from behind. Pry gently; then move along, easing stop off gradually. Pull it out at bottom to free it from miter at top. Protect the ragged paint edge so that it will match when it is replaced.



**2 WITH STOP OFF**, the window can be swung out on this side, revealing the cord groove and knot pocket. Pull out the broken cord. Slip the sash out of the opposite channel, release the cord on that side, and let the weight draw it up. The knot in the cord will keep it from pulling through past the pulley.



**3 CARDBOARD-PADDED PLIERS** protect the finish as you start pulling the parting strip loose at the bottom. As you move up the strip, slide the top sash all the way down. Then pull the parting strip out of its groove at the top. Bend it carefully out of the window frame and lift it out from behind the check rail.

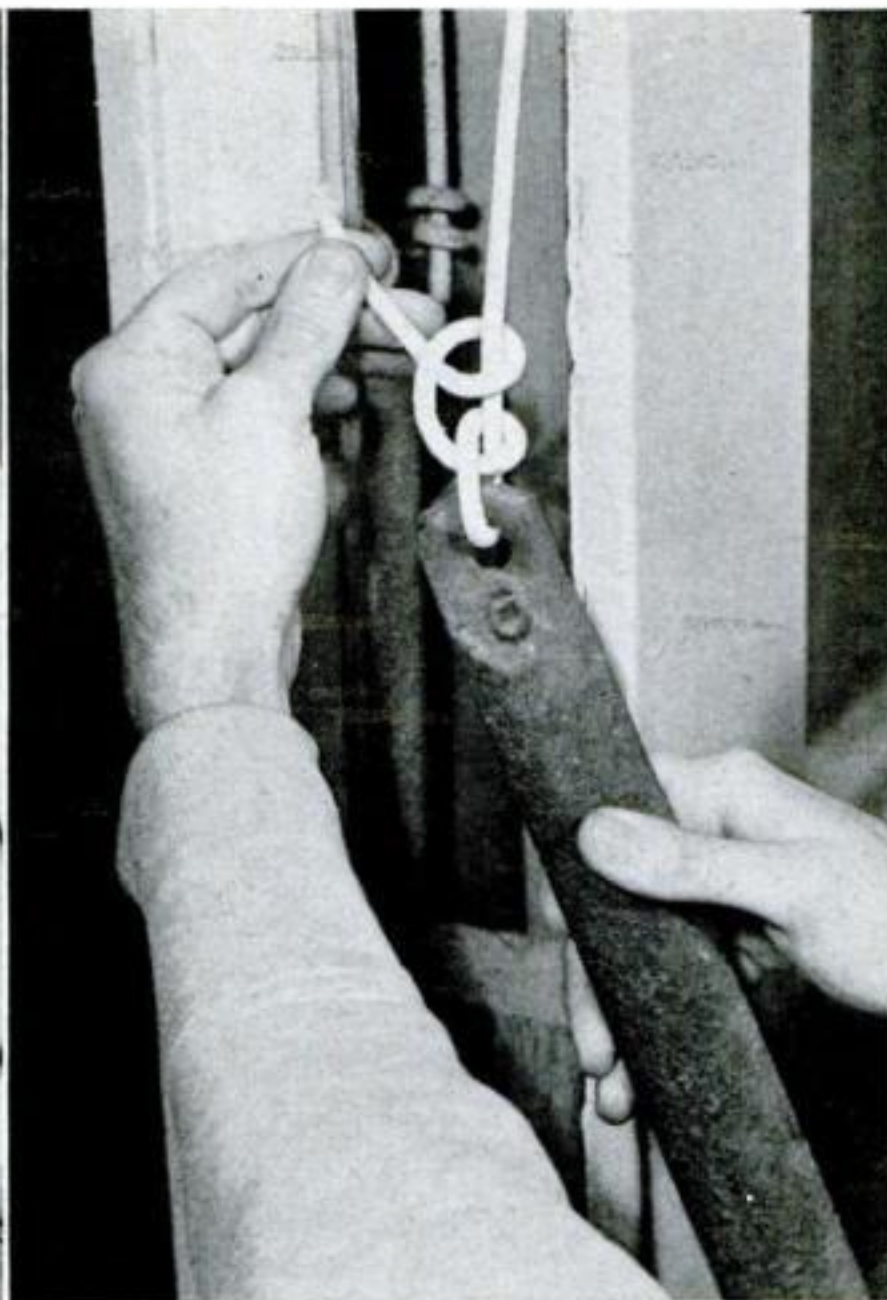


**4 PRY OUT** the weight-pocket cover after removing any nails or screws holding it. If it was never cut free, finish the partial cut with a keyhole saw. Insert a tool along the parting-strip groove to break the cover out. Ganged windows may have only one cover each; to reach blind pockets, go through next window.





**5 LIFT OUT DROPPED WEIGHT.** Cut new cord or chain to total length of broken cord, allowing for knots, or set sash on sill to estimate length. If cord won't feed down over pulley, tie a wire-solder hairpin on string, drop it over, tie the cord on and pull it through. The chain will feed down if you hold up the free end.



**6 KNOT OUTER END** of new cord (or slip a nail through a chain link) so that it won't slip past the pulley. Tie sash weight to the end inside the pocket with two half hitches or a bowline knot, pulling the cord tight with pliers. Secure chain to weight by looping it through and pinching a clip through two links.



**7 TIE A TIGHT KNOT** on the free cord end, place sash on the sill, and push knot into its pocket, securing it with a nail if you like. Pull down and seat the opposite cord in its groove and knot pocket. Then swing the sash back into its channel.



**8 REPLACE POCKET COVER,** parting strip and outer sash. Pull old nails out of the stop strip from behind so as not to harm paint. Nail the stop back, matching up the cracked paint edges. Try sliding sash before driving nails fully. Relocate stop if sash binds or rattles.



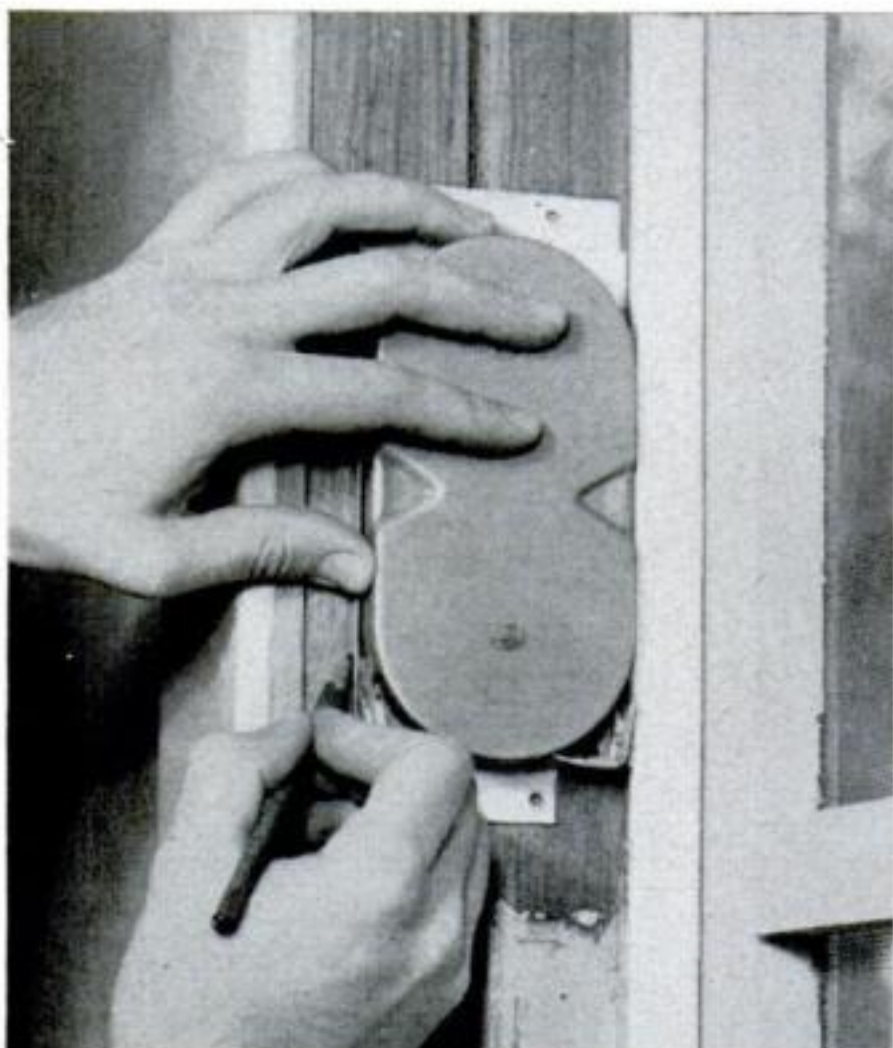
**9 SET NAILS** and putty the holes over them. Little if any touch-up should be necessary. Oil the cord pulleys sparingly. Lubricate channels with a block of kitchen paraffin as above, or with some liquid floor wax. Never use oil; it becomes gummy and will collect dirt.

**Please turn the page for more about windows**

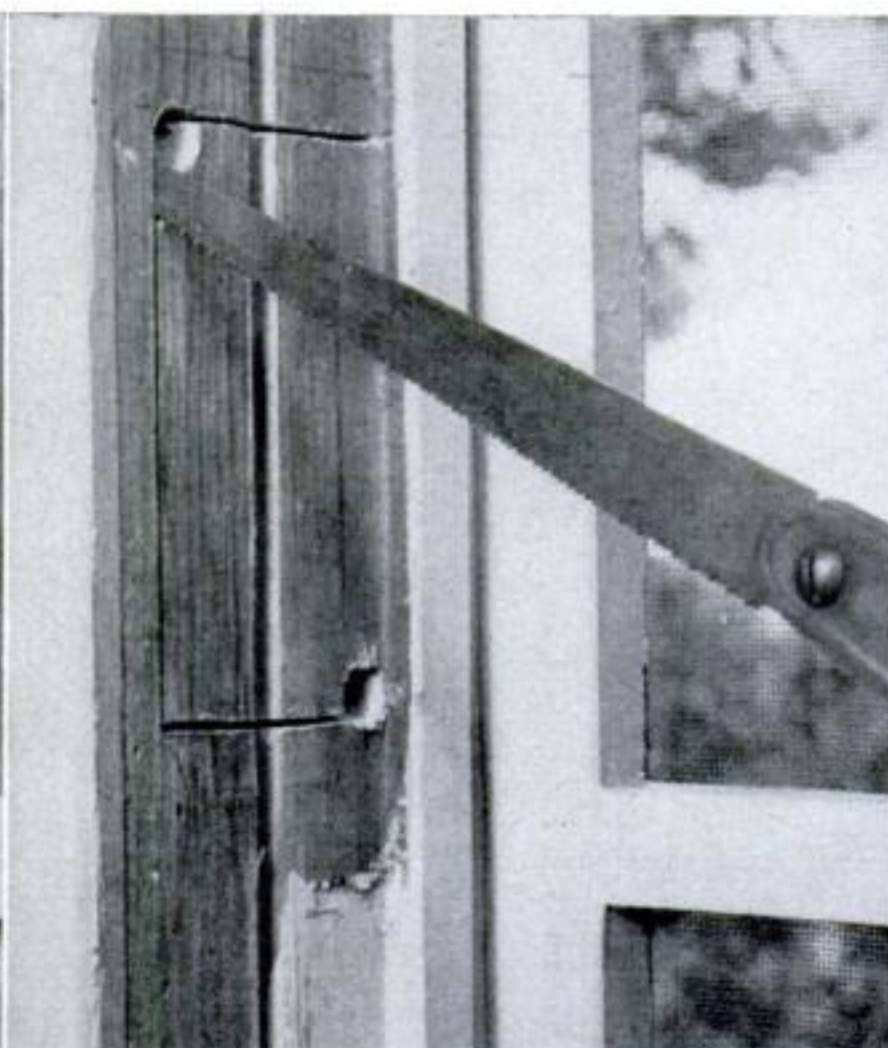
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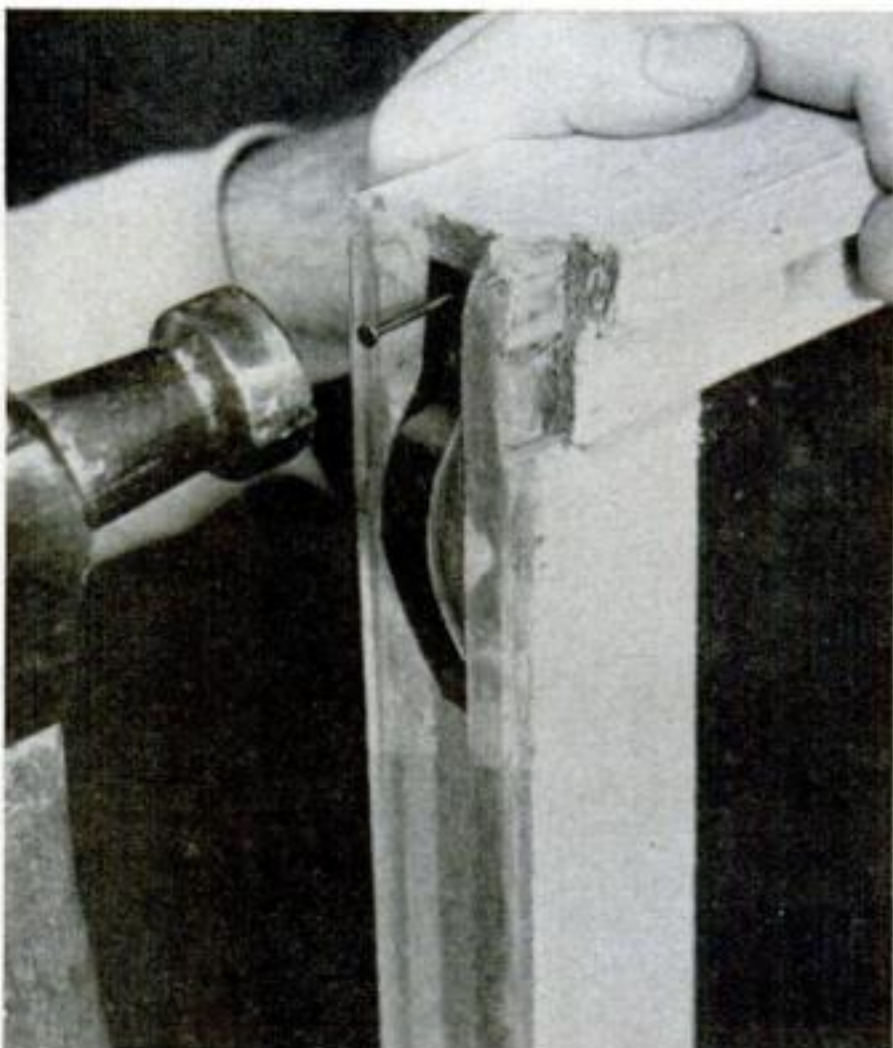
## Installing spring balances eliminates cords and weights



**1 ONE TWIN SPRING BALANCE** will handle both upper and lower sashes for all but the largest windows. The type of balance shown here is mounted 2" above the middle of the window frame. Set spring tension to suit the weight of your sashes. Remove both sashes, hold the balance in place, and mark around it.



**2 MARK MORTISE OPENING** required inside the pencil lines, so that the flanges of the balance will overlap the wood. Drill holes at two corners; then cut along mortise lines with a keyhole saw. If old paint in the channels impedes free sliding of the sash, now is the time to scrape the paint off and wax the surface.



**3 ONE-SIDED LIFT** tends to cock the sashes, making them hard to slide. You can compensate for this by nailing a spring glide into the cord groove at the opposite upper corner of each sash. When spring balances are used on both sides, the glide is not necessary.

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**4 FASTEN BALANCE IN PLACE** with screws. Notch the parting strip to fit over it if necessary. Pull each cable out with pliers to hook its clip under the sash, and fasten with nails provided. Replace the outer sash, parting strip, inner sash and stop, in that order. **END**

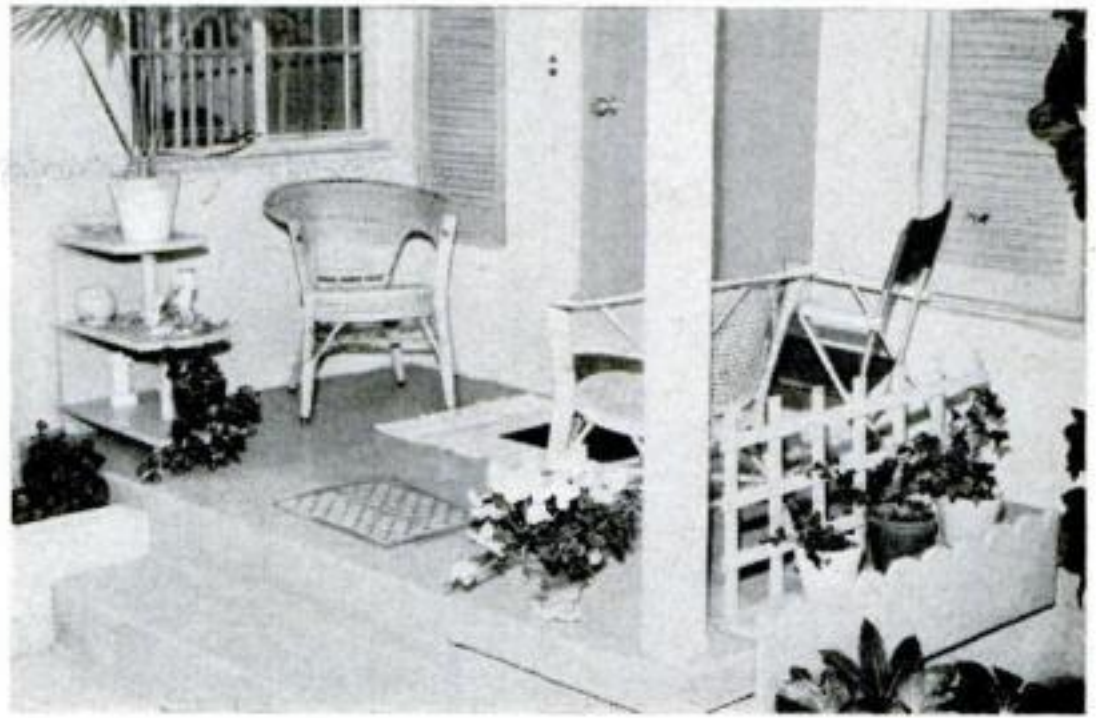


## Two Stands for Holding Potted Plants Decorate Small Porch

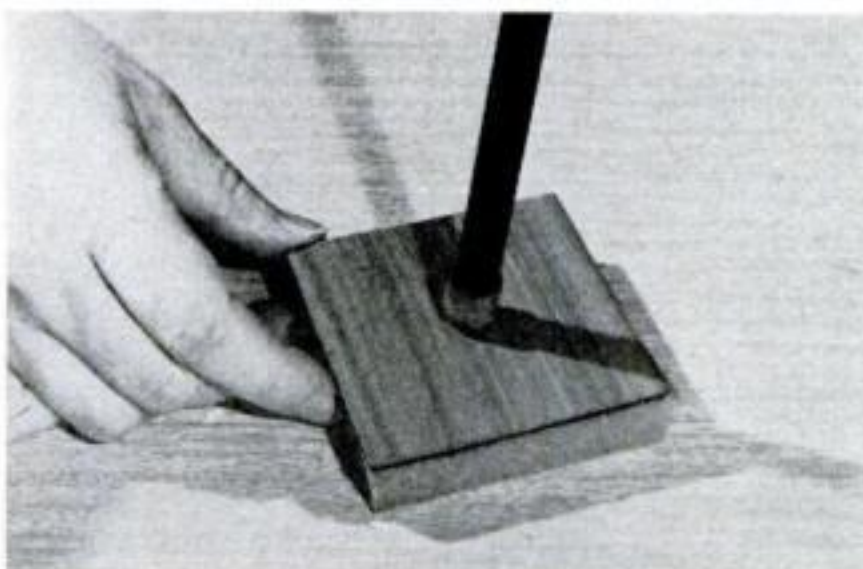
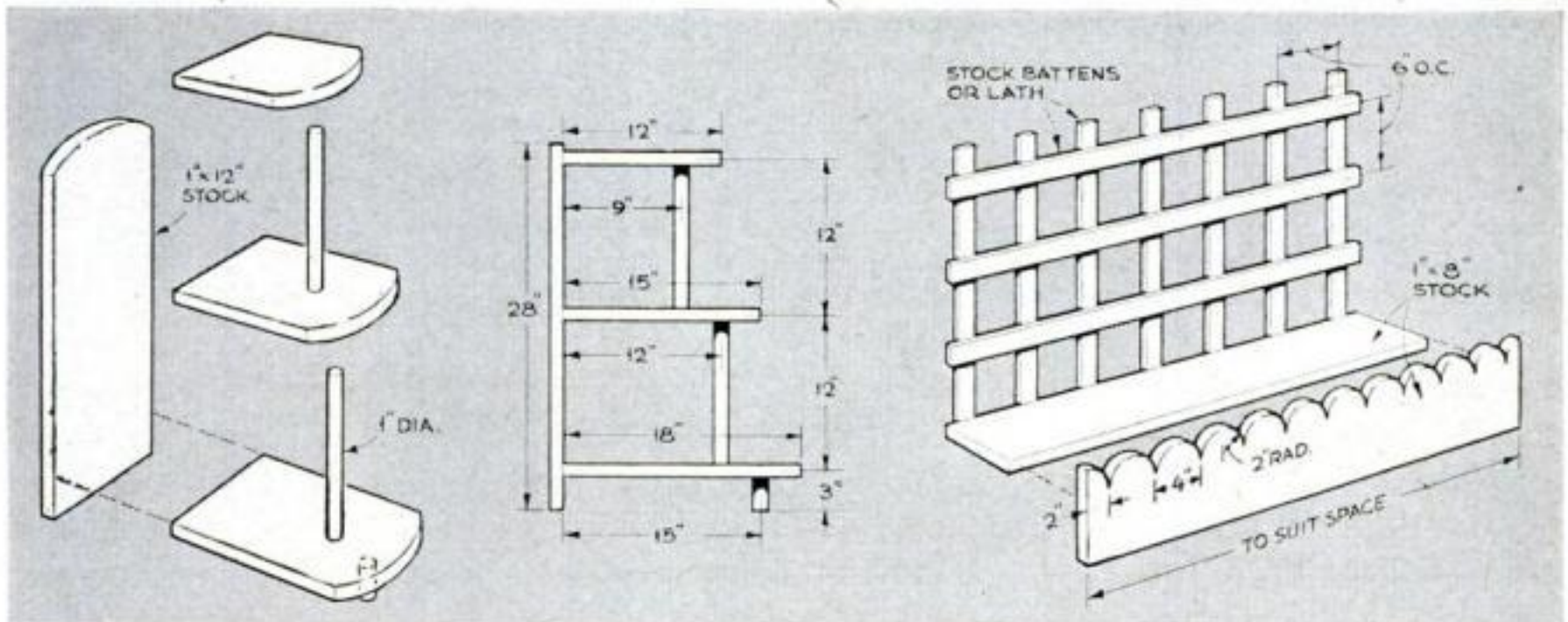
THIS pair of handsome plant stands can be made with hand tools from easily obtained stock. Assembly throughout is with finishing nails. Both can be completed and painted in an afternoon.

For the three-shelf stand at left in the photo you will need 1"-by-12" lumber and 1" dowel or flagpole stock. If you prefer mortising and gluing the dowels for additional strength, you can bore blind holes with an expansive bit.

The trellis of the pot holder at right is made of stock battens or building lath, and the floor base and decorative

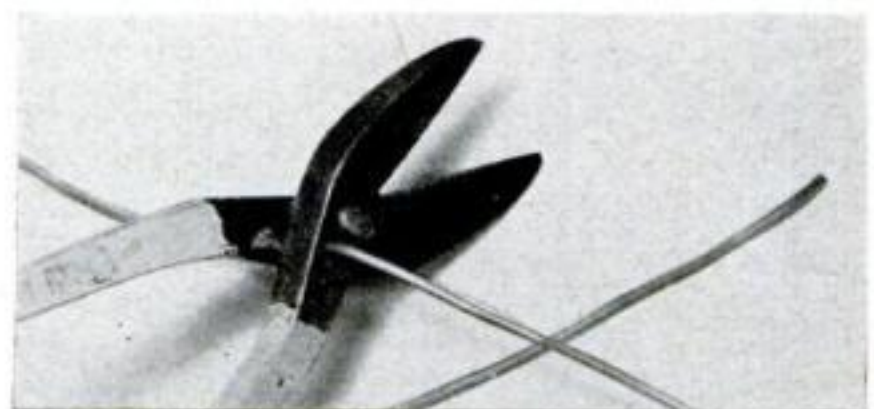


overhang out of 1"-by-8" boards. You can cut the curves with a keyhole or coping saw.—*Hi Sibley, Nuevo, Calif.*



### Pads Stop TV Vibrations

A TV set may seem much louder than it is because of vibrations carried along the floor. These can be reduced by placing the set on sponge-rubber pads. Fit squares of hardboard over the pads to keep the legs from sinking into them.



### Tin Snips Cut Wire, Too

WHEN wire cutters aren't handy, it's common practice to use tin snips instead. But this dulls the cutting edges. You can get around that by drilling a  $5/32$ " hole straight through both jaws. Open them about as shown in the photo for best operation. I "resharpen" my cutting hole by redrilling it slightly larger.—*H. J. Gerber, Stillwater, Okla.*



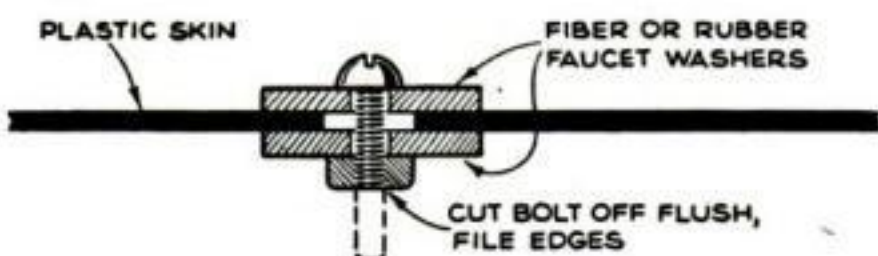


## Metal Tray Used for Top of Patio Table

THE top of this patio table is a deep-lipped round metal tray. It was screwed to a 2' length of 3"-diameter stock (square stock or a two-by-four would do), and then set in a 10"-square box of cement. Both the tray and stand were finished with enamel.

## How to Cut Plate Glass

HEAVY plate glass, softer than ordinary window glass, should be cut with a dull glass cutter. A sharp one will flake the surface.



## Hole Plugged in Plastic Pool

WHEN our kiddie pool developed a leak in its plastic-impregnated canvas side, I made a quick, permanent patch with two faucet washers and a small bolt and nut. I put the bolt through with the head on the inside, cut the end flush and rounded the sharp edges of the nut with a file.—Bill Arter, Worthington, Ohio.



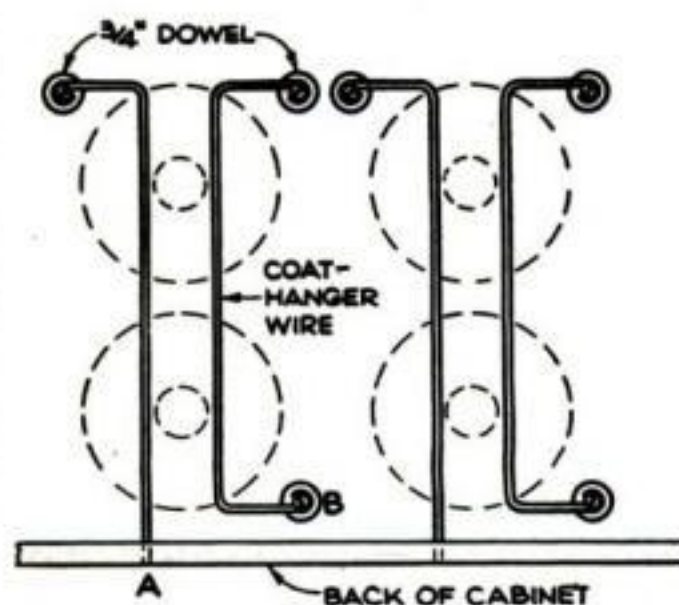
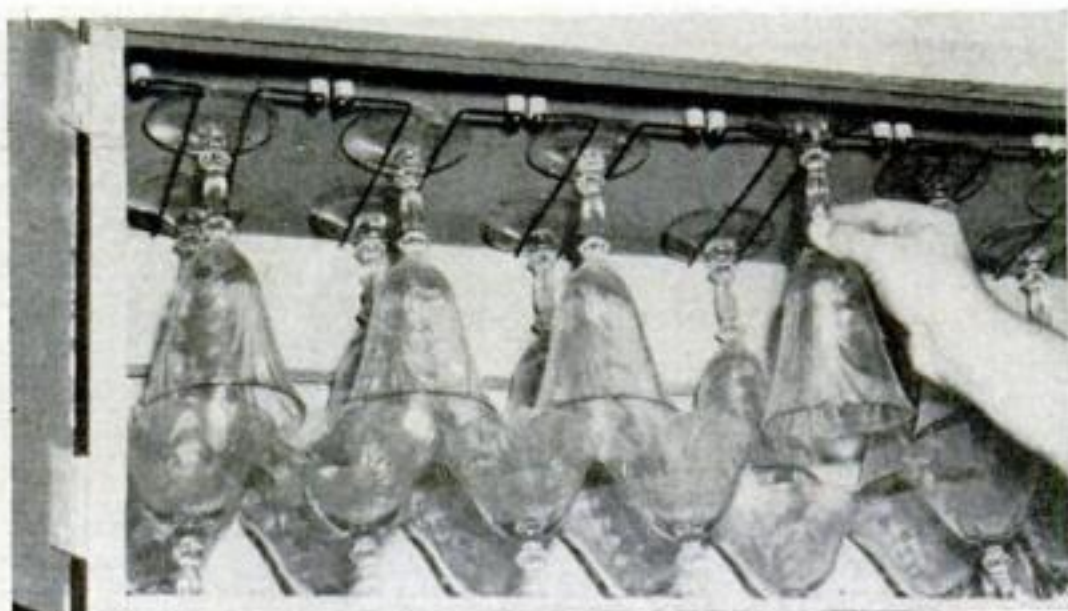
## Brush Skidproofs Concrete

You can skidproof a new concrete walk by scratching over it with a stiff-bristled brush. Do it just before the concrete sets, or the scoring will settle.

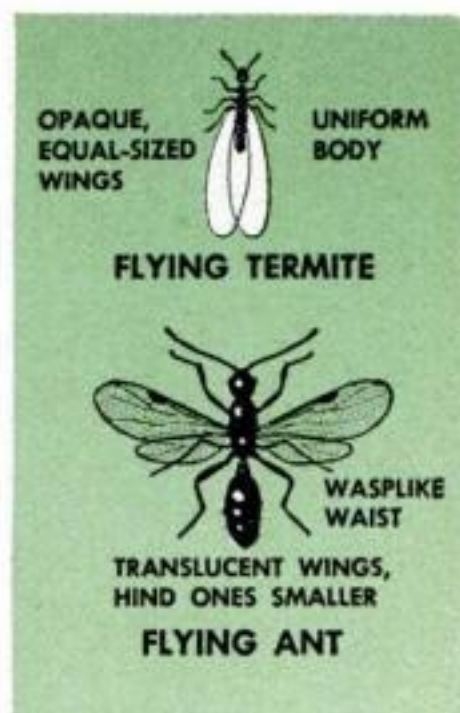
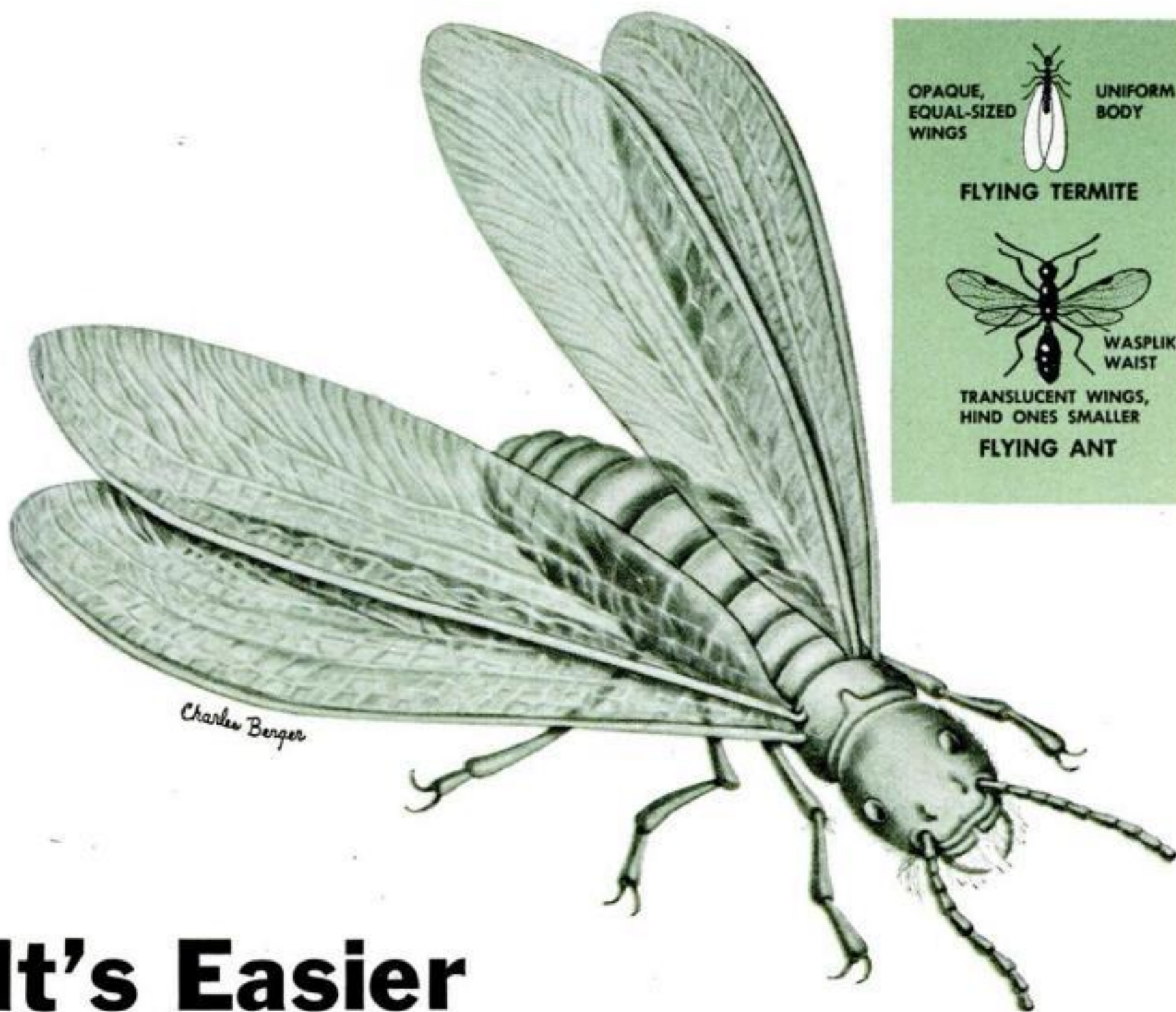
## Glassware Hooks Onto Brackets Formed from Hanger Wire

SMART glassware hangers, made from coat-hanger wire and dowels, will double shelf capacity. Each wire support is held away from the shelf either with one spacer block made of  $\frac{3}{4}$ " dowel and a hole drilled in the back of the cabinet

(A, in diagram), or with two spacer blocks (B). Roundhead screws, passing through eyes bent in the ends of the wire and on through center holes in the dowels, attach the assemblies to the shelf.—R. K. DuVall, San Jose, Calif.







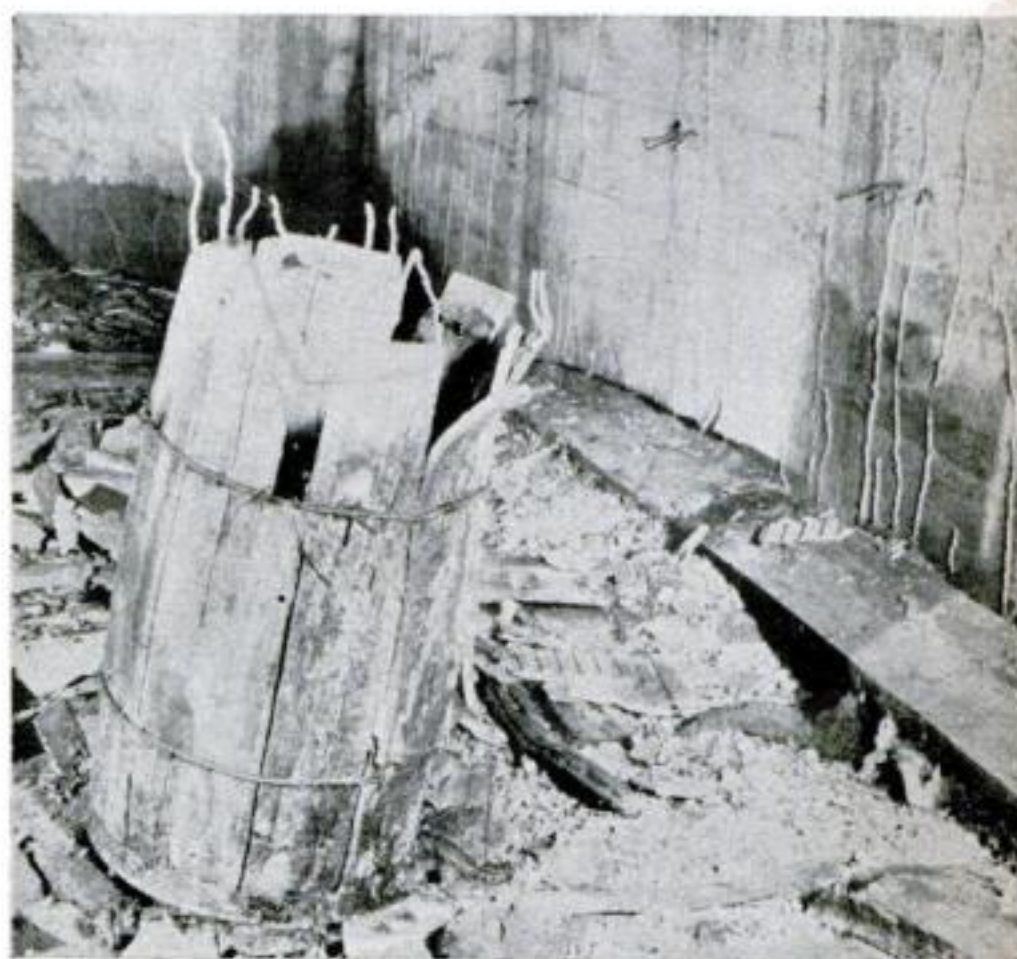
# It's Easier to Stop Termites Now

By David X. Manners

**Y**OU'RE not likely to know that there are termites in your house unless you look. But if you find them, there is no longer any need to get panicky. With the simpler treatment methods now available, you can probably get rid of the destructive bugs yourself.

The good news about termites is chlordane, an insecticide introduced a few years back and now quite readily obtainable. Chlordane kills termites. It does not harm plants, however, as older termite poisons do. This means that you can soak the soil next to your house foundation with the stuff and create a barrier impenetrable to termites, without seriously affecting your cherished shrubs.

Such treatment generally kills off termites inside a house—they cannot live



**MUDLIKE TUBES** rising from the rim of this barrel show how termites grope for food and moisture. Note other termite tubes on the wall.



## Some places to look for termites



**AROUND THE FOUNDATION.** Stucco had to be removed from this house to repair the damage.



**ANY DAMP PLACE.** Here, water seeped behind a chimney to provide moisture termites need.

without a good connection between their wood food supply and the ground.

**Climate for termites.** There is bad news about termites, too: They may attack your house no matter where it is located. Old textbooks call termites tropical insects. But the bugs are damaging house beams in such very non-tropical places as Minnesota, Illinois and Quebec. Heated houses create the climate that termites like.

While termites have probably always lived in woodland over much of the United States, it is only recently that they became serious house pests in the North. Before 1930, reports Dr. John B. Schmitt, Rutgers University entomologist, an average of half a dozen mail inquiries about termites were received each year at the New Jersey Agricultural Experiment Station. Now the average is 800 inquiries a year.

Dr. Schmitt blames new building styles. Houses are now set close to the ground, with earth-filled porches, stoops and terraces. These masonry slabs, laid over dirt fill right next to the house frame, are the worst offenders. They cause seven out of 10 termite cases.

The earth fill under the slab often contains scrap wood, in which the termites establish themselves. They then need travel only a short distance—all underground—to get at the house sill.

Even without such an easy entry, the insects may find cracks in a masonry foundation and worm their way through them to the wood frame above. Or they may build tunnels over the foundation to reach the wood. The closer wood is to the ground, the easier it is for termites to attack it.

**How to find termites.** When the forsythia blooms, the flying termites swarm. Watch for them and check the ground around your house for their wings, which they soon shed. There is no point in killing the swarmers because nearly all of them die quickly anyway. But find out if they were raised inside your house.

Narrow mud tubes crossing foundation walls are a more serious danger sign. These are tunnels that worker termites—the ones that damage houses—build to provide a protected passageway between ground and wood. The termites may travel through them, but the tubes are also air ducts, to supply moisture to the wood feeding place. Destroying the tunnels that you can see won't help at all. There are probably more that you cannot see. And the termites will replace the tubes that you knock down.

Actual damage to your house is proof that termites have attacked (although they may since have died out). The most likely places to look are:

- The sill atop the foundation wall,





**UNDER THE HOUSE.** Test the soundness of all wood with an icepick, screwdriver or hatchet.

especially where it abuts outside steps, porches or terraces.

- Other beams in the cellar.
- Any wood—paneling or flooring—laid over masonry.
- The lower pieces of exterior siding.

Termite damage is invisible from the outside. The bugs often eat away the interior of a beam and leave an unblemished outer shell. To find their work you have to probe with a sharp tool such as an icepick. If you find big hollow spaces inside the wood, be suspicious.

The ordinary masonry house—brick or stucco over a wood frame—is particularly vulnerable to termite attack. The masonry usually extends down below

ground level, and the insects can crawl up behind it, protected from the sun and dry air that they dislike, to the wood.

**Is it termites?** Even experts are sometimes fooled, so do not jump to conclusions. Here are identification tips:

- Flying termites are  $\frac{3}{8}$ " long, black, with fat bodies (no waistline), and four opaque wings all the same size. Flying ants, which resemble termites, can be distinguished by their variable size ( $\frac{1}{8}$ " to  $\frac{3}{8}$ " ), indented waistlines and translucent wings (their hind wings are also smaller than the fore wings).

- Termite damage is distinctive, too. The insects consume wood entirely, leaving behind only excreta spots. They eat along the grain, taking the soft summer growth but not the harder, more compact winter growth. When a piece of termite-ridden wood is split open, you will not find the cross-checking that dry rot causes.

- Get expert advice. Your state agricultural college will tell you what you have if you mail in a few insects or wings, or a bit of damaged wood.

**How to get rid of termites.** A simple barrier of insecticide-soaked soil around your house foundation will generally cure a mild attack. This prevents termites from entering the house, and kills the termites inside the house as they try to return to the ground. Any remaining in the house die from lack of moisture.

Chlordane is the preferred chemical,

## **Simple precautions and good housekeeping keep termites away**

**LITTER NEAR A BUILDING,** plus wood siding meeting the soil, make it easy for termites to reach frame. A clean yard discourages them.

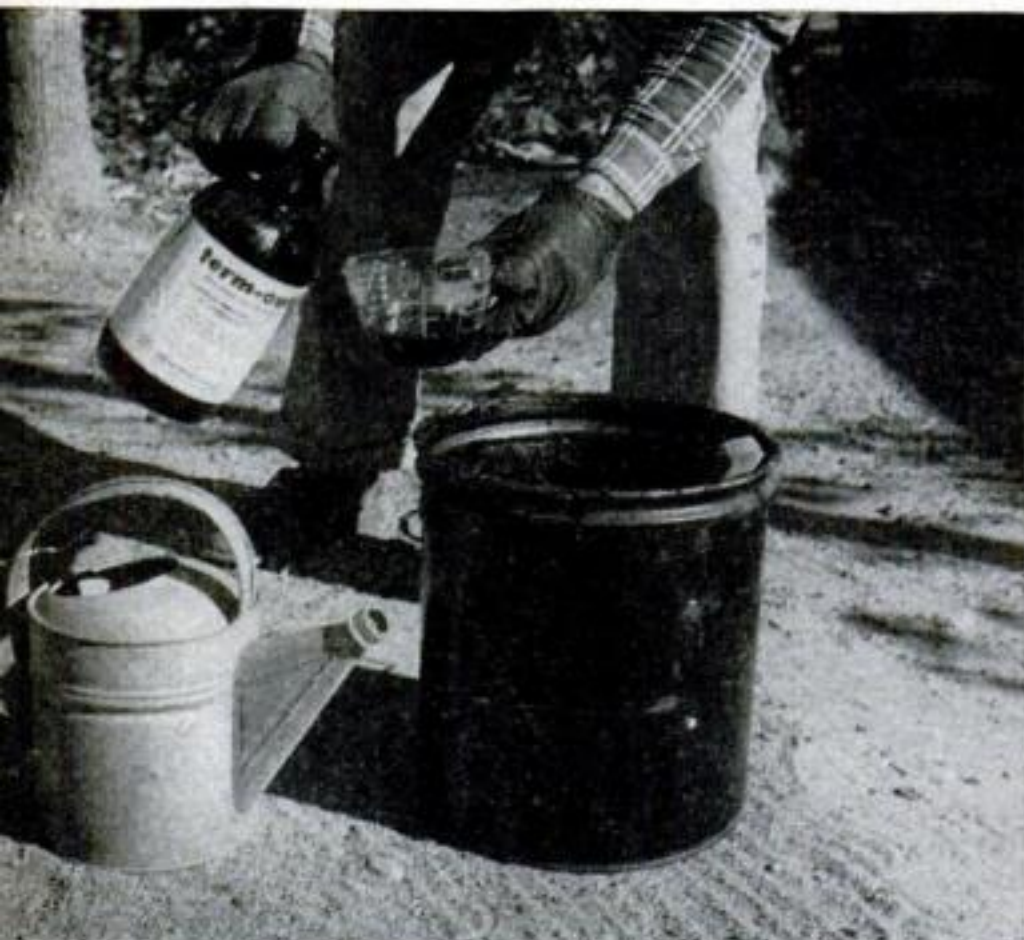


**WOOD FENCE** attached to this house gives termites a direct path. Keep any soil-touching wood at least 6" away from the house itself.





## How to rid your house of termites



**MIX POISON OUTDOORS.** Use rubber gloves; keep pets and children away. Do not use poison in any area where it may seep into a well.



**TRENCH** encircling the house offers best way to apply poison. Depth depends on soil drainage—poison must reach bottom of foundation.

since it can be used without risking damage to plants. You buy the chlordane\* as a concentrated liquid emulsion and dilute this with water to a two-percent solution. Do not try to use chlordane powder (such as is sold for dusting plants)—you can't dissolve it in water to make it soak through the soil.

The insecticide is poured into a trench dug all around the house. Start a spade about a foot out from the foundation and dig at a slant, striking the foundation at a depth of 12" or 15". This is deep enough for normal soils. Dense clay, which resists penetration of the liquid, must be dug out several feet deep. With very heavy soil, you may have to poke holes with a steel rod at 6" intervals in the bottom of the trench to make sure that the insecticide gets all the way to the bottom of the foundation.

Pour the solution into the bottom of the trench. If your land slopes, dig and treat the trench a section at a time; otherwise the solution runs off without penetrating. Finally, fill the trench back up, soaking the dirt with insecticide.

**Where masonry touches wood.** Don't

\*Chlordane can be bought by mail from Compass Research Associates, 4135 Brownsville Rd., Pittsburgh 27; or from Rose Exterminator Co., Court and Walnut Sts., Cincinnati 2.

forget your front stoop, porch and terrace if they are masonry slabs that touch the house framing. This is probably the most important part of the job.

Break open the slab near the house. Take out any old pieces of wood you find underneath. Inspect the house parts below slab level for termite damage and replace where necessary. Then thoroughly mix plenty of insecticide into the dirt fill and repair the slab.

**If you have a dirt cellar** or crawl space, the inside of the foundation needs treating, too. A shallow trench, and less insecticide—two quarts per foot of trench length—will do. Treat the ground around piers and shallow garage foundations the same way.

This is probably as far as you will have to go. The insecticide barrier will last until it is washed away, probably five or 10 years, depending on how much rain you get and how much you sprinkle your shrubs.

You can check on its effectiveness by planting small stakes around the house. Pull them up each year and examine for termite damage. This same test is a help when you first find termite damage inside your house; it will tell whether the





**IN A CRAWL SPACE**, chemically treat all the soil. Pay particular attention to areas around piers and chimney bases, and along the walls.



**A BIG DRILL** like this, rented for about \$3 a day, can be used to drill  $\frac{1}{2}$ " holes through concrete slabs for poisoning soil underneath.

insects are still active or have died out.

**Bad cases.** If your house is heavily attacked, further measures are advisable. You may want professional help.

Treat the inside spaces of hollow-block foundations. Bore holes into the blocks at about grade level and pour into each a half-pint of insecticide (chlordane or pentachlorophenol in water). Then plug the holes.

Impregnate structural timbers with pentachlorophenol in oil. Professional exterminators use special pressure equipment, but you can do a fair job by spreading the chemical in cracks and by squirting it into suspicious places. Probe around with a small drill, and where you find soft or empty places, spray chemical in with a force oiler (the kind that

[\[Continued on page 246\]](#)

## TERMITE POISONS

|                       | Carrier                                   | Desired Concentration       | Needed for 5 Gal. of Poison | Application Per Foot of Trench |        |
|-----------------------|---|-----------------------------|-----------------------------|--------------------------------|--------|
|                       |   |                             |                             | Foundations                    | Piers  |
| Chlordane 62%         | water                                     | 2%                          | 1 pint                      | 1 gal.                         | 2 qts. |
| Sodium arsenite 40%   | water                                     | 10%                         | 1 gal.                      | 1 gal.                         | 2 qts. |
| Pentachlorophenol 40% | fuel oil or water                         | 5%                          | $\frac{1}{2}$ gal.          | 1 gal.                         | 2 qts. |
| DDT powder 50%        | fuel or diesel oil                        | 5%                          | 4 lb., 6 oz.                | 1 gal.                         | 2 qts. |
| Orthodichlorobenzene  | 5% pentachlorophenol-oil solution (above) | 1 part to 2 parts penta-oil | 1 $\frac{1}{2}$ gal.        | 1 gal.                         | 2 qts. |

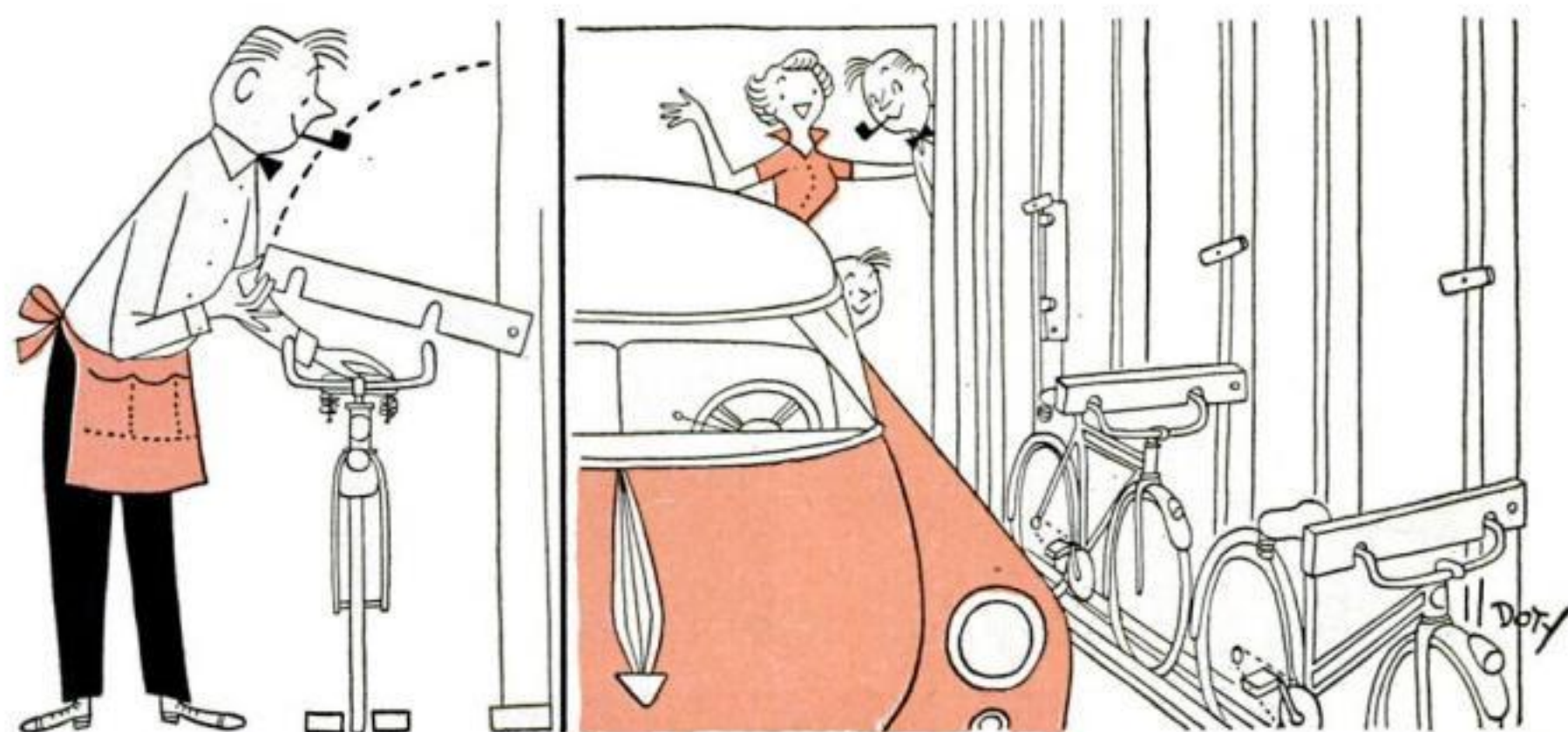
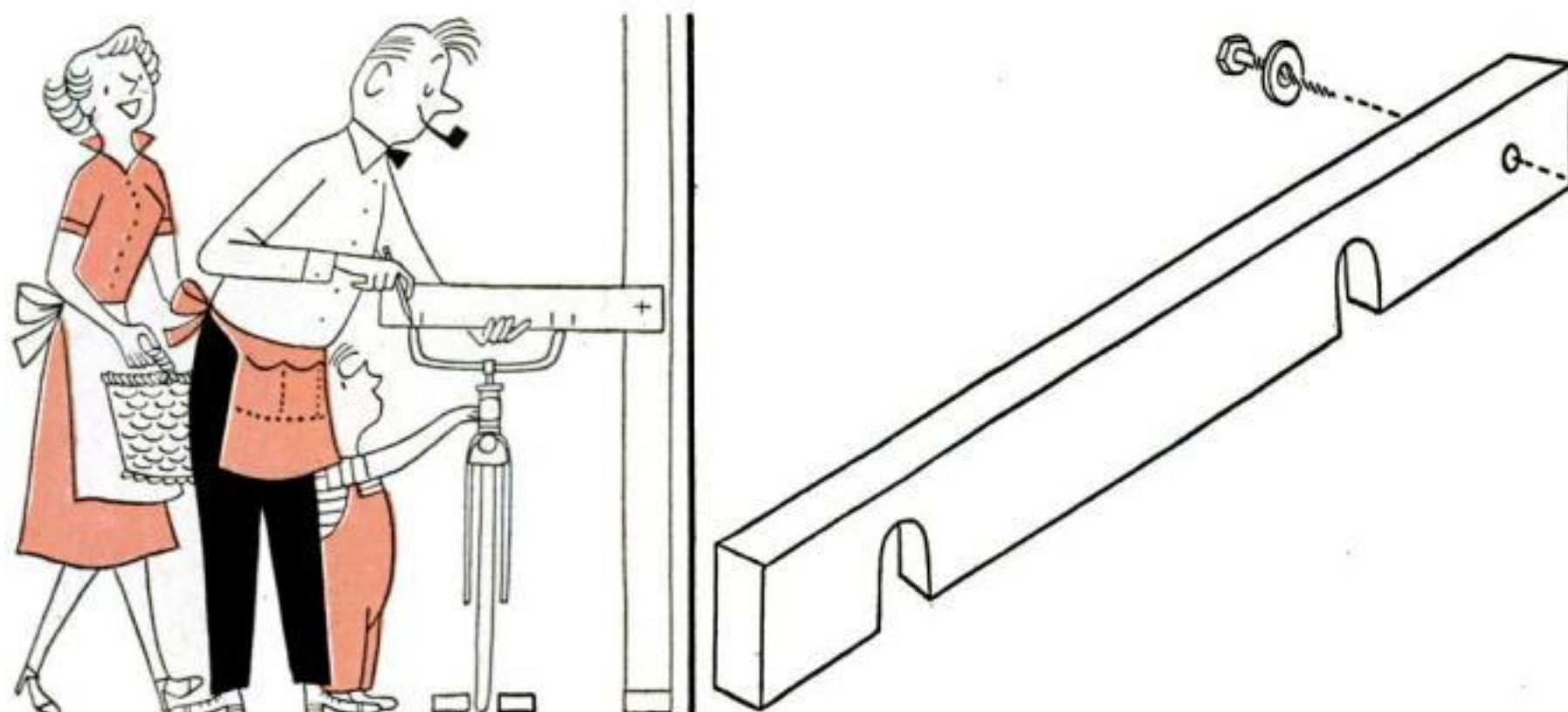
FOR YOUR POPULAR SCIENCE MONTHLY INFORMATION FILE



# Wordless Workshop







**Next Month: An auto trash bin for tidy on-the-road picnics**

**MAY 1956 187**



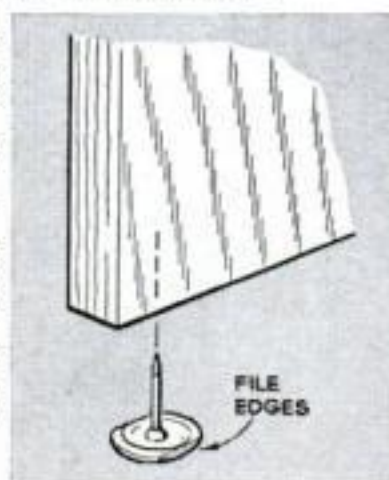
## Half Section of Rubber Hose Sands Outside Curves



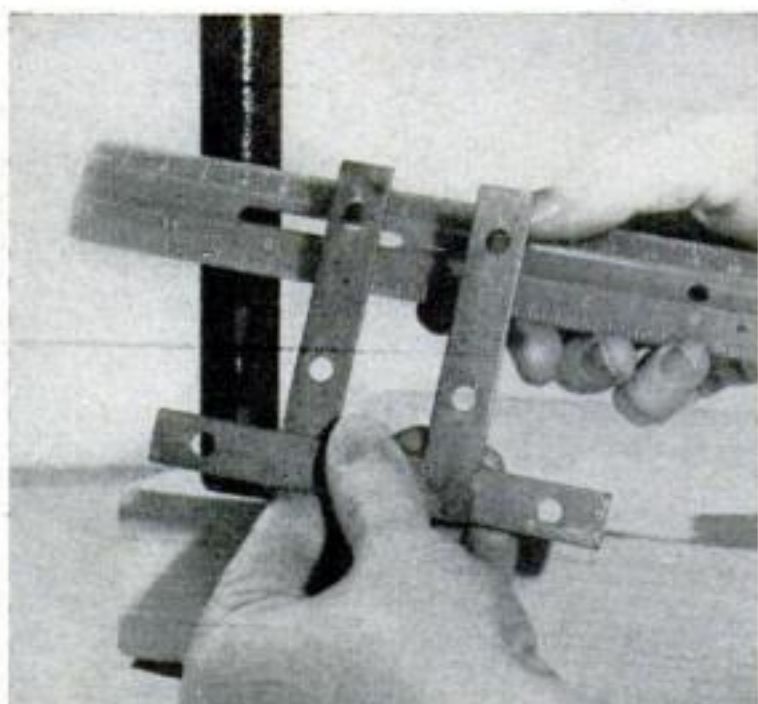
A SANDING block to smooth rounded surfaces, such as molding, picture frames and other curved work, can be quickly made from a half section of rubber hose. The sandpaper is glued to the inside.

## Door Glides on Thumbtacks

SLIDING cabinet doors will ride more smoothly if you drive a few thumbtacks into the bottom edges for gliders. The sides of the tacks should be filed to the thickness of the doors.

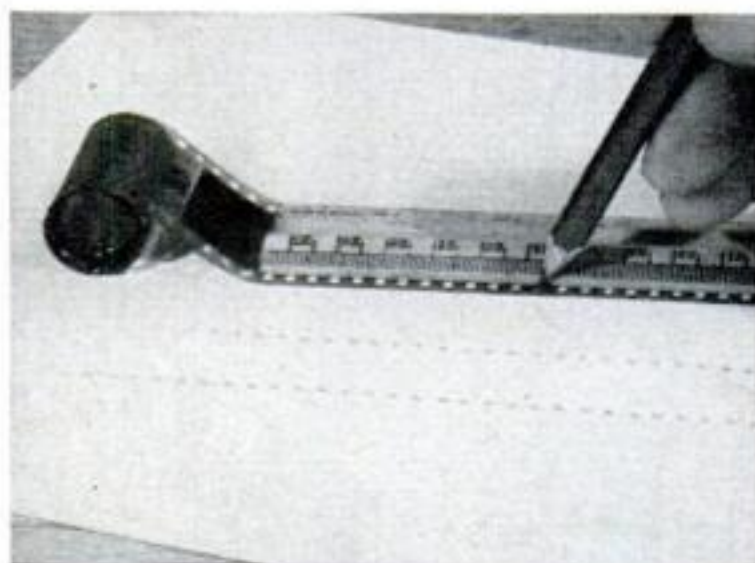


## DO IT THE EASY WAY



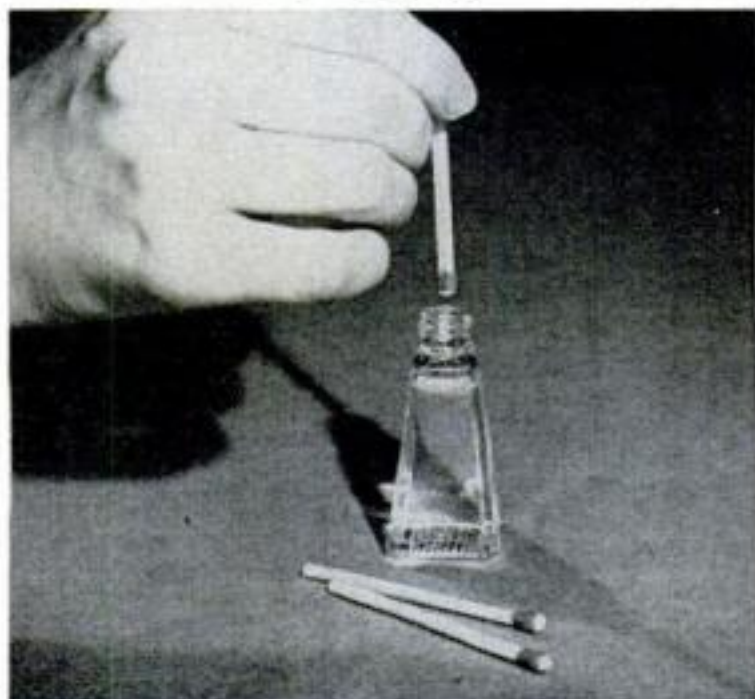
**PIPE DIAMETER?** Measure it accurately with a ruler and pair of flat mending plates. Hold the overlapping legs square as you close the jaws on the pipe.

**CALKING NARROW CRACKS?** Fit a flat-tipped nozzle on the calking gun, made from a piece of metal tubing of the right size. Flatten the end by pressing in a vise.



**DRAWING BROKEN LINES?** A strip of 35-mm. film serves as a guide for even spacing. Put a ruler on the film next to the slots and draw over the holes.

**GOING CAMPING?** Waterproof a batch of wood matches by dipping into nail polish.







# How to Put Down Parquet Floors

By **N. Raskhodoff**

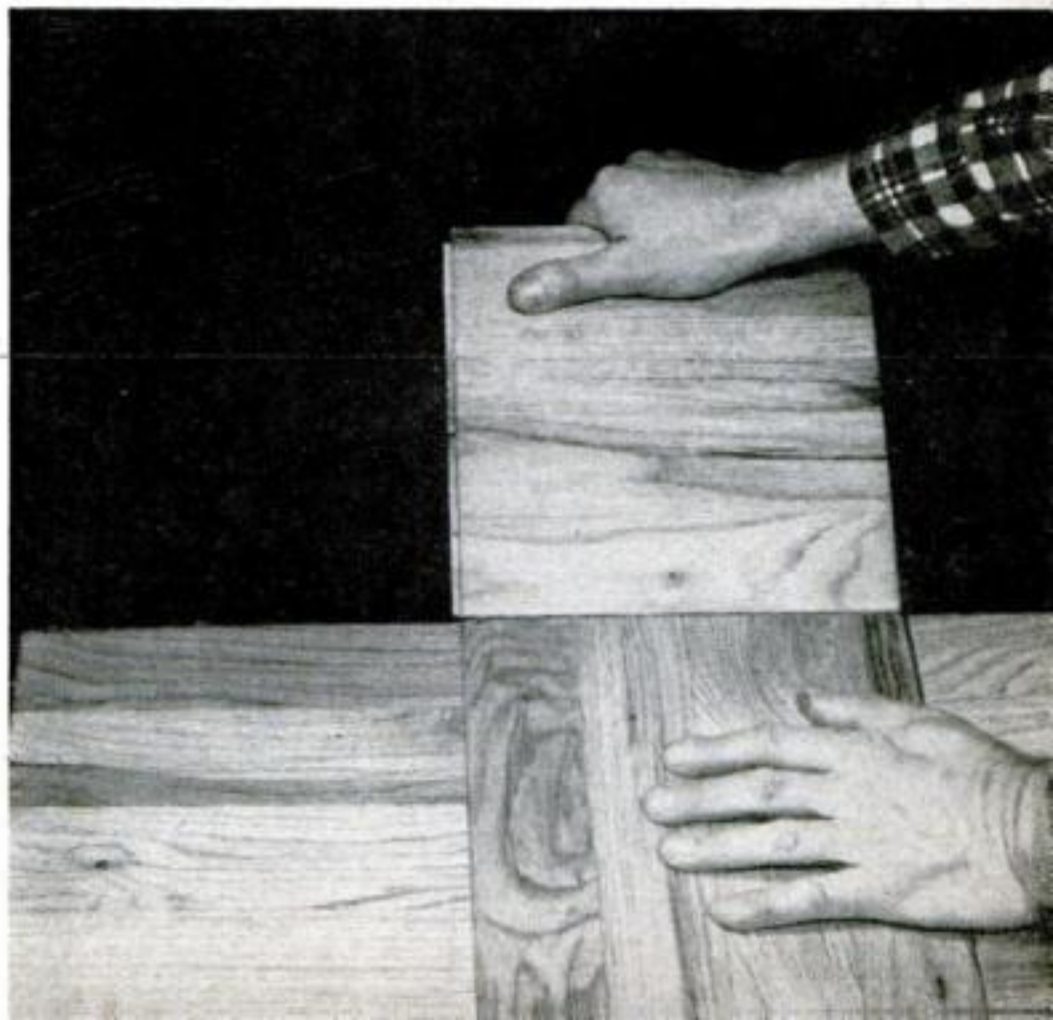
**Y**OU see more parquet floors in modern homes these days—and for good reason. They're easier to lay down than in the old days. Here's why:

- You do no nailing. Today's parquet comes in precut square "tiles" that are laid in mastic as easily as other types of floor tiles.

- You do no finishing. The tiles are presanded and polished, ready to walk on as soon as they're down.

- You can put them anywhere—over an old floor or subfloor, over a radiant-heated slab, even over a basement concrete floor.

The parquet squares are a bit more

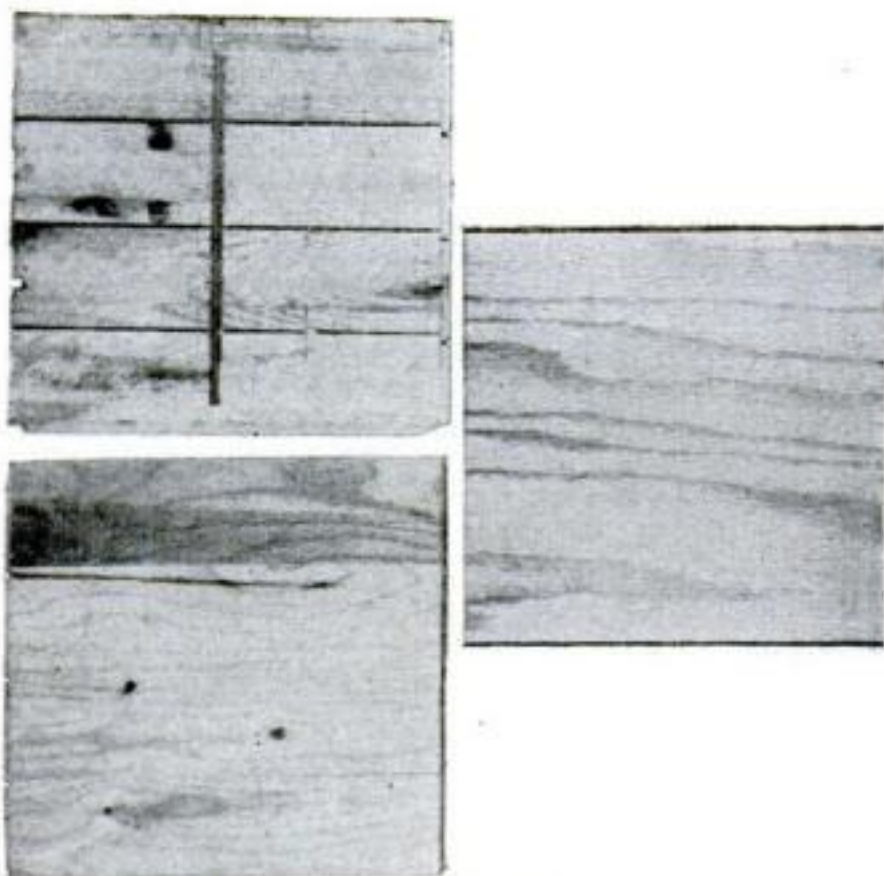




## Laying the parquet blocks in mastic makes the job go fast

expensive than conventional hardwood strips, but since you save on the finishing the cost doesn't get out of hand. You get a dividend, too—a floor that won't creak, loosen or develop cracks. That's because shrinkage and movement are spread over many short pieces instead of fewer long ones.

**Two types of tiles** give you a choice of a sectional block (strips bound together)  $25/32$ " thick, or a one-piece,



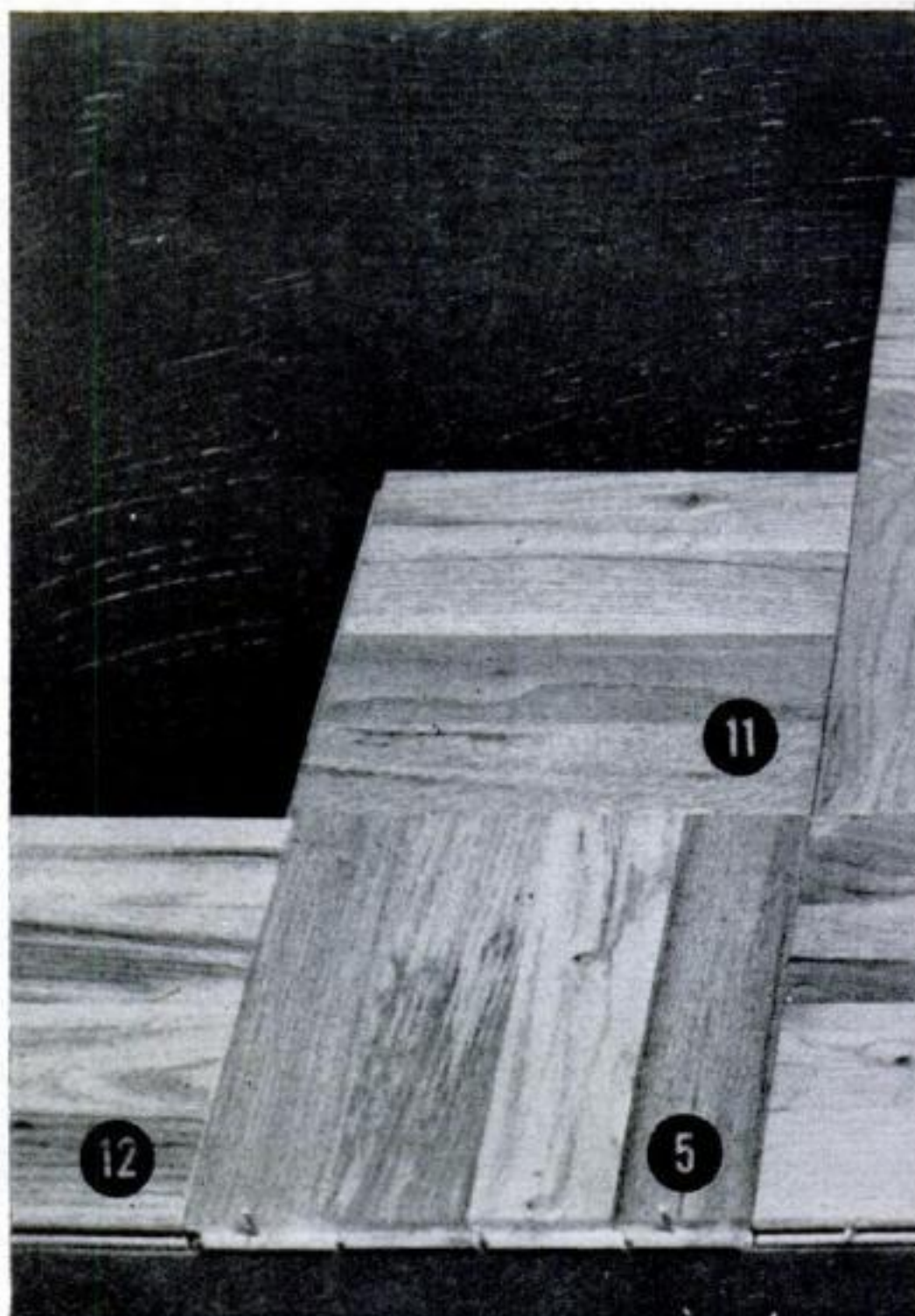
**SECTIONAL BLOCK** at left has separate strips joined by a metal spline on the back (top view). One-piece type at right above is made of laminated plies and comes  $\frac{1}{2}$ " or  $\frac{3}{4}$ " thick.

plywood-like square  $\frac{1}{2}$ " or  $\frac{3}{4}$ " thick. The one-piece block, newest comer, is especially recommended in the  $\frac{1}{2}$ " thickness for use over radiant floors and asphalt tile. It stays put better under changes in temperature and humidity.

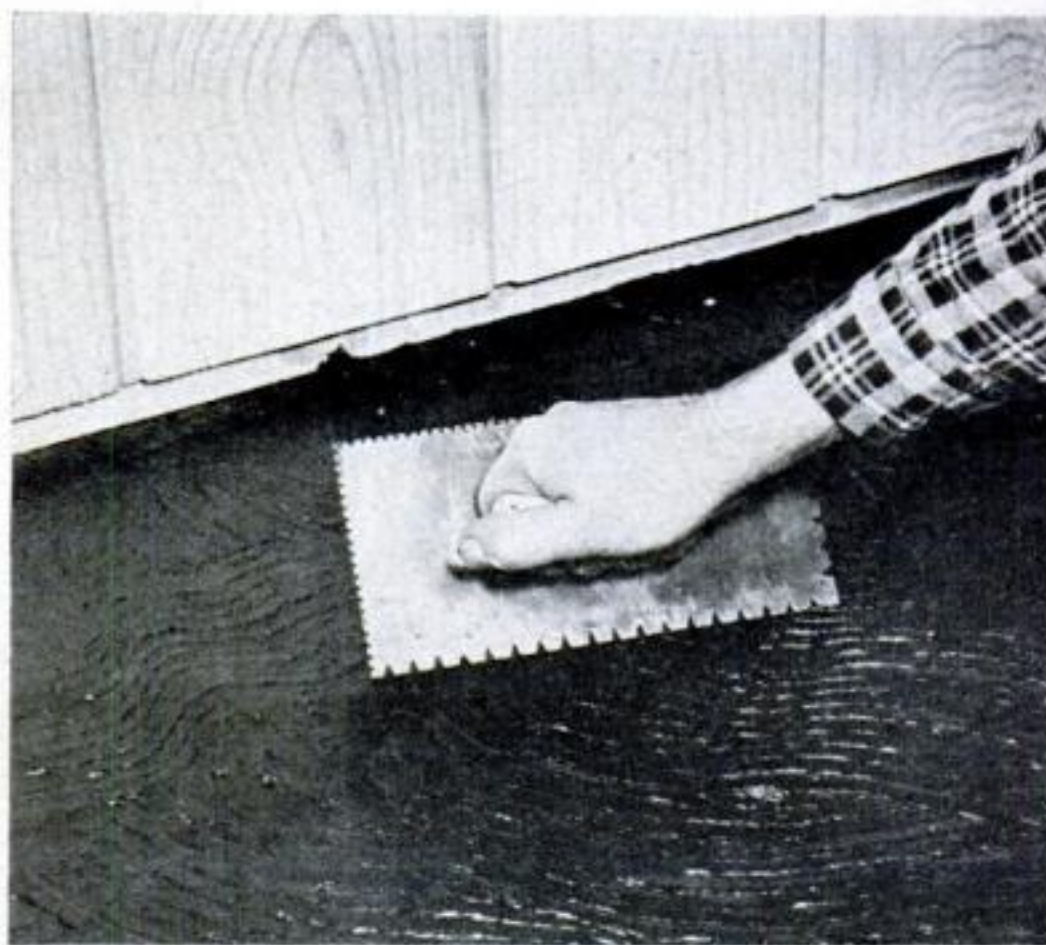
The sectional block is slightly flexible, permitting it to conform to small irregularities in the subfloor. It also comes in a wide selection of woods—maple, beech, birch, pecan—as well as traditional oak.

Both types are most commonly available in 9" squares and are laid in a checkerboard pattern with the grain or strips running in alternate directions.

**Expansion strips** are a must, to per-

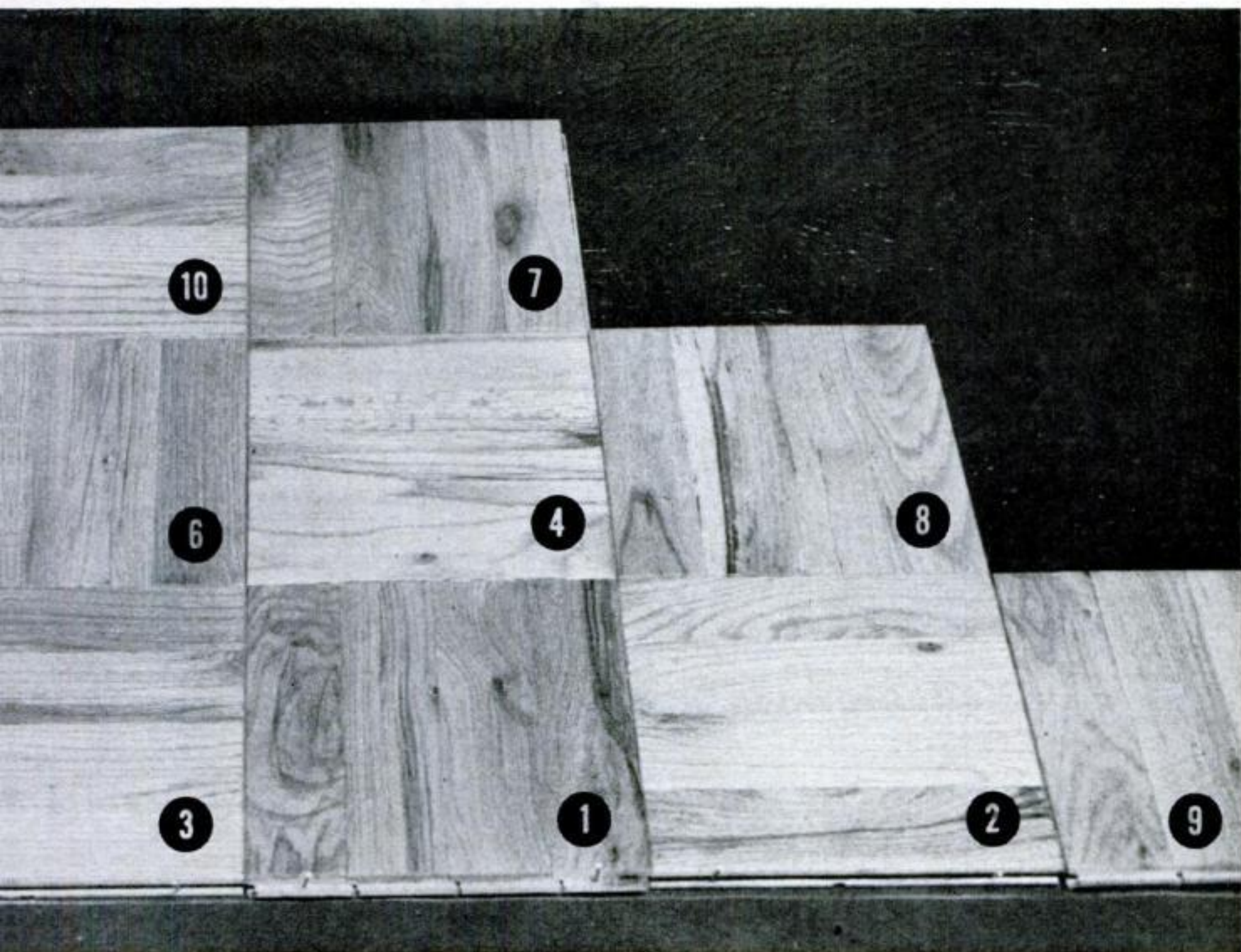


**PYRAMID METHOD** of laying blocks provides two adjacent edges for each new block to butt



**BIG-TOOTH TROWEL** spreads mastic on thickly. You can make one, as here, by filing notches in plain edge of an asphalt-tile trowel. Cut them  $\frac{1}{4}$ " deep,  $\frac{3}{16}$ " wide and about  $\frac{1}{2}$ " apart.



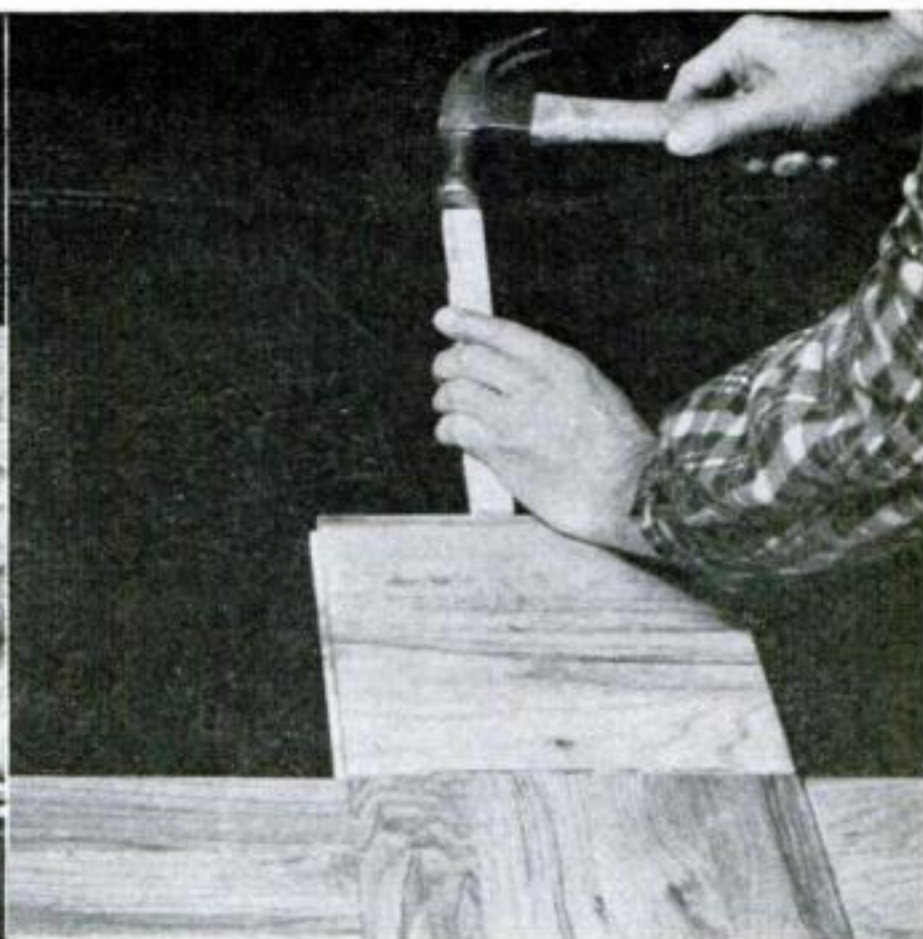


against, helping to keep pattern square. Follow the order shown, working up one side and down

the other. Lay all the blocks on one side of the chalk line before starting on the other side.



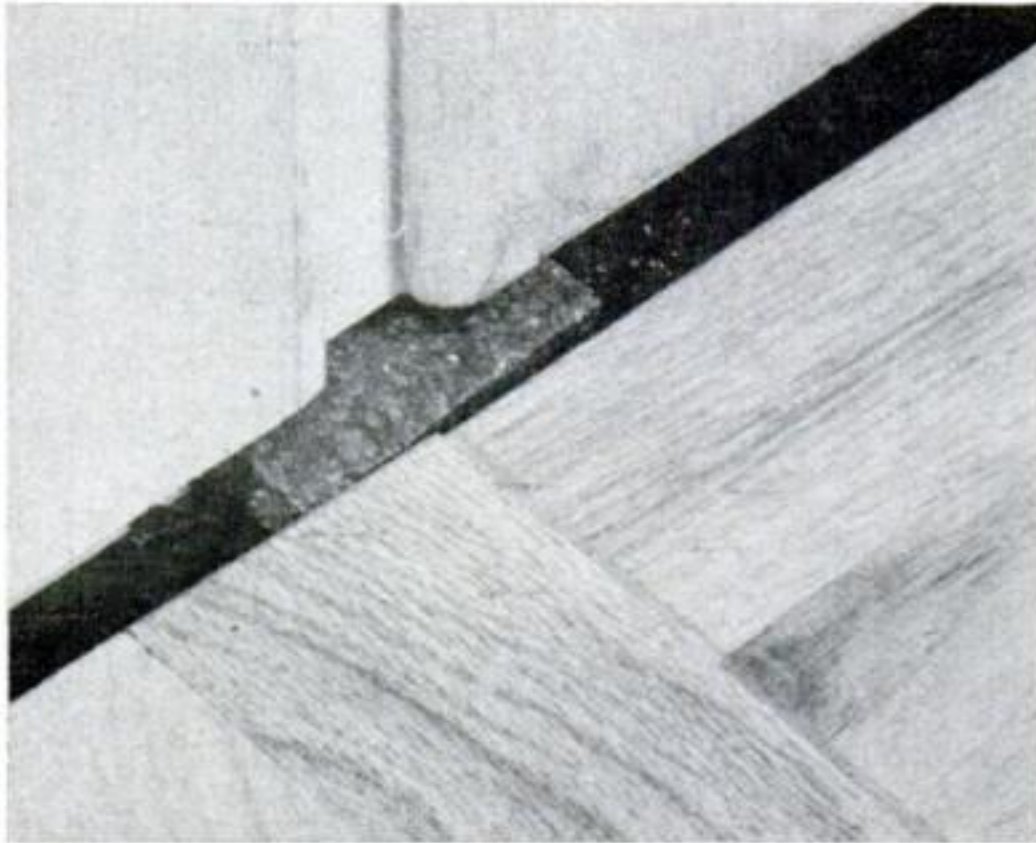
**START BLOCKS** at chalk line, temporarily nailing down one edge through predrilled holes so that the wood won't split. This will give you an anchor to push the next blocks against.



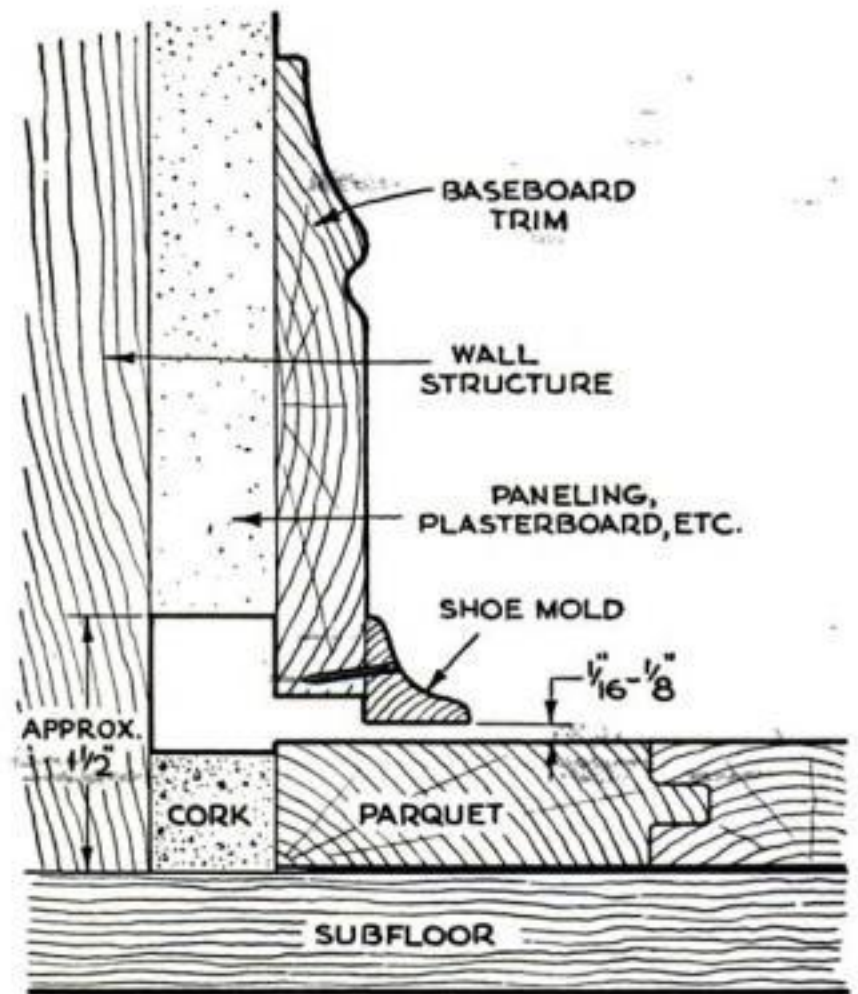
**TAP JOINTS TIGHT**, using a softwood stick. Tip the blocks into place—don't slide them—to keep from scooping up the mastic. Check alignment periodically with a carpenter's square.



## Cork spacers and expansion gaps are the secret to a smooth, even floor



**CORK BUFFERS** between wall and floor "give" as wood swells, preventing blocks from heaving. Cut them 2" to 3" long and place one at each joint. Cork is later concealed by baseboard.



On new construction, start cork at wall frame instead of wall surface (above). Note that shoe molding is nailed to wall and must clear floor slightly to permit vertical swelling.

mit swelling of the wood that might otherwise cause the blocks to buckle. These are strips of cork  $\frac{3}{4}$ " to 1" wide, 2" or 3" long, that are set at intervals against the walls to back up each joint. (The baseboard and molding are first removed, of course.)

You can buy the cork in sheets at lumberyards and building-supply houses, either  $\frac{1}{2}$ " or  $\frac{3}{4}$ " thick, to match the thickness of the blocks.

To estimate the number of blocks that you'll need, divide the length and width (in inches) of the room by nine to find how many of the 9" squares will go in each direction. Then multiply the number of blocks along the length by the number along the width to find the total number needed.

Count each fractional block as a full one, and don't forget to allow for the removal of the baseboards and the insertion of the cork strips. The blocks are usually sold in bundles of 16 for about 45 cents a square foot.

Try to store the blocks at least a week ahead (even up to several months if you can) so that they can adjust to moisture

conditions in the room where they are to be used. This will help minimize expansion and contraction of the wood.

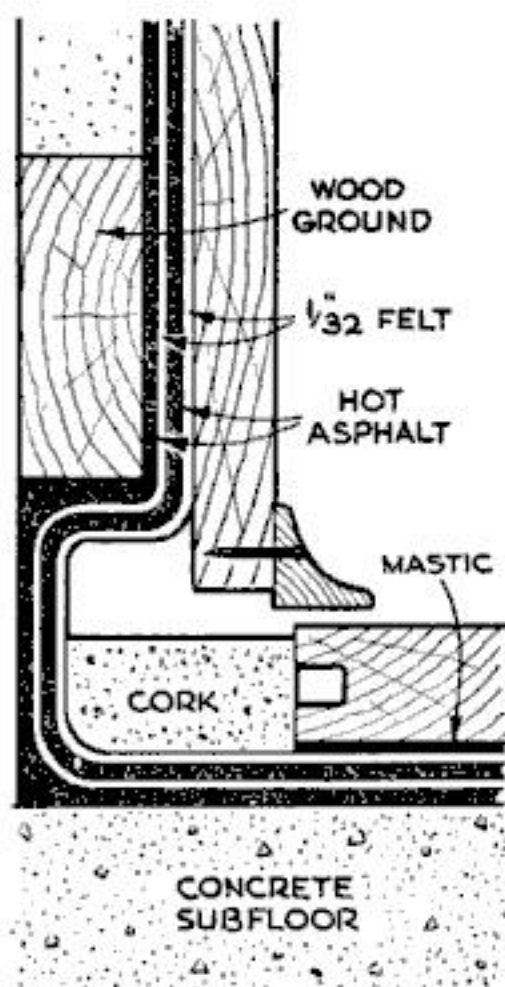
While you're waiting, you can prepare the floor by renailing any loose or warped boards or by patching low spots in concrete. Then put down a layer of 15-pound saturated felt, laid in regular asphalt-tile paste. The felt comes in strips and should be cut to fit like a wall-to-wall carpet with the edges butted snugly together.

**Laying out the pattern** is done in the same way as for floor tiles, using a chalk centerline to start the blocks straight.

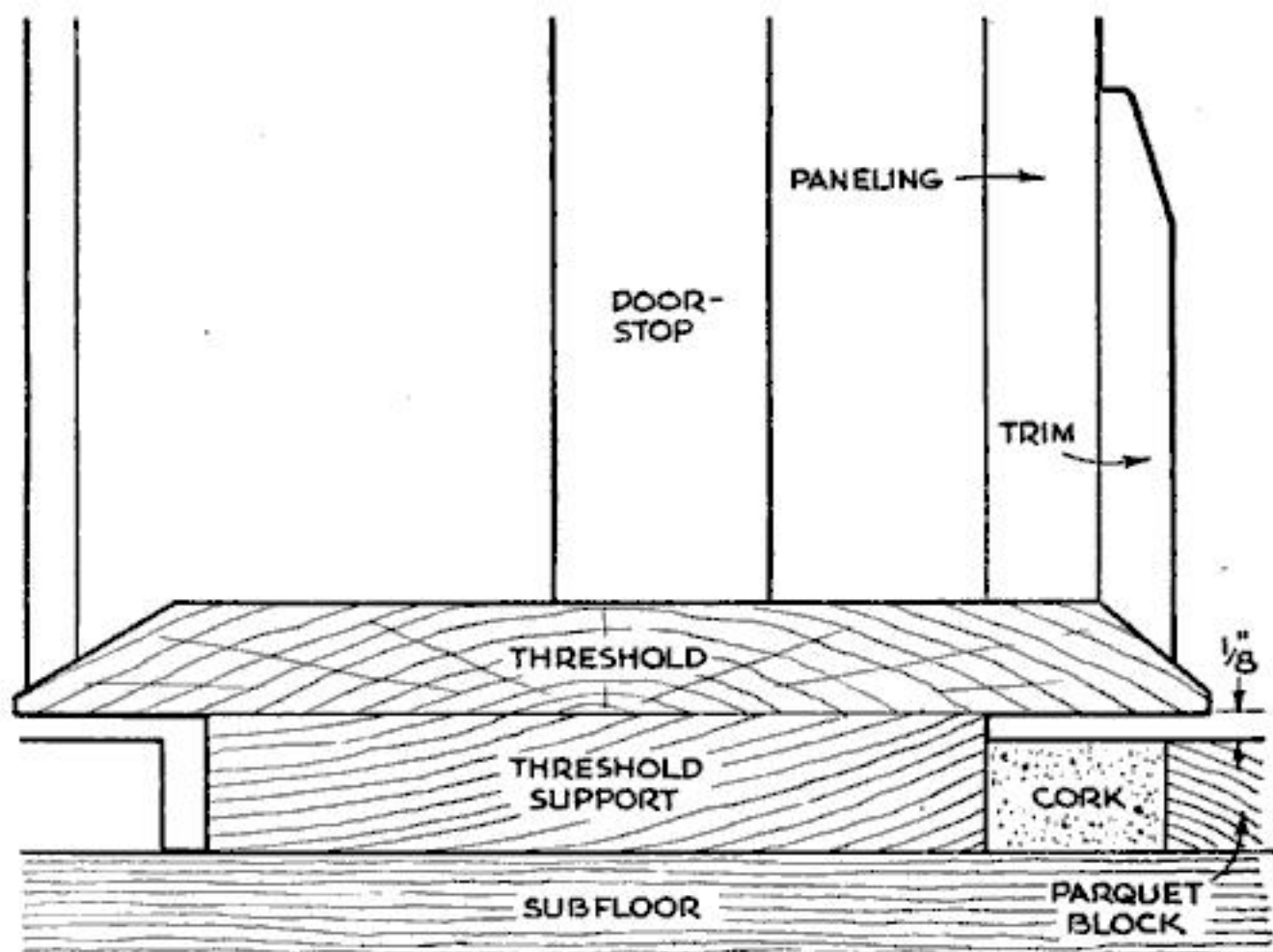
If the fractional blocks at the sides are a half or more wide, it's best to center the pattern exactly in the room. But if they come out only 1" or 2" wide (too narrow for good appearance), shift your centerline sideways just enough to bring all of the fractional blocks along one wall.

You may also have to shift the line if there are an odd number of blocks across the room since the center row would cover up the centerline. In this case, move the line half a block to one side so





**CONCRETE SLABS** on or below the ground may need waterproofing if excessively damp. Lay two layers of felt in asphalt or waterproof mastic and run the edges 5" up the side walls.



**AT DOORWAYS**, threshold strip must be blocked up to clear new floor  $\frac{1}{8}$ " to  $\frac{1}{16}$ ". Cork strips are then fitted between the support strip and blocks in the same way as at the walls.

that it will fall at the edge of a row.

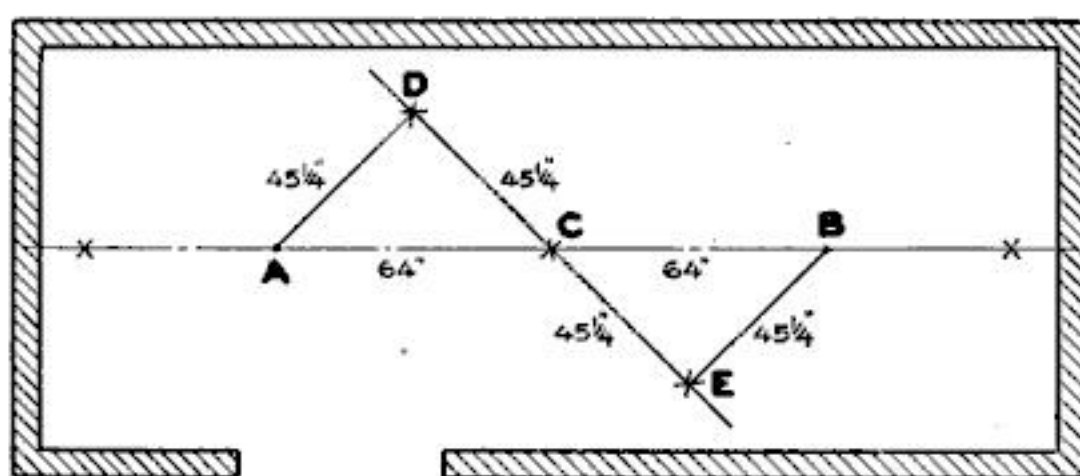
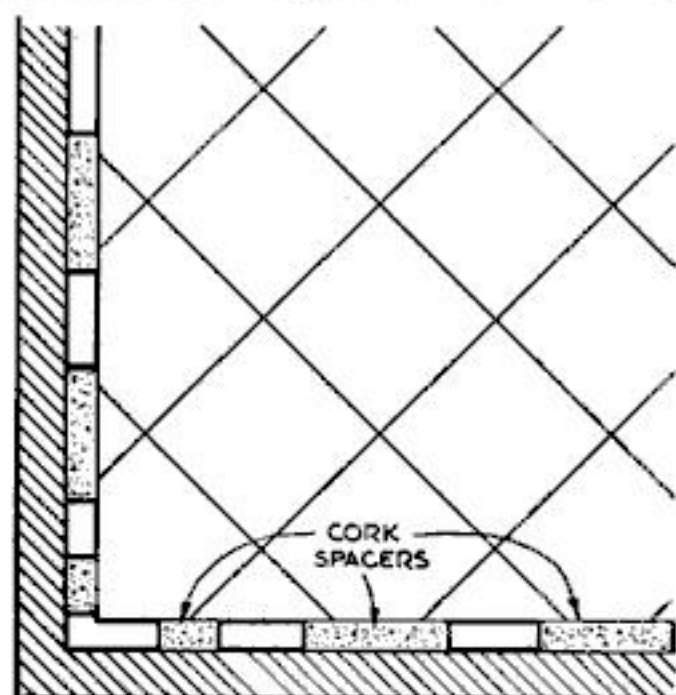
**You'll need a special trowel** with extra-large teeth for spreading the mastic, which is put on thicker than ordinary tile paste. If your dealer doesn't stock one, you can adapt a plain-edge trowel as shown in a photo.

Spread the mastic over the entire half of the room that's to be done first and let it stand one to two hours before setting the blocks. In starting the first block, be sure to note again whether the row running this way contains an odd or even

number of tiles. If odd, place the midpoint of the first block at the midpoint of the centerline; if even, start the edge of the block at the midpoint.

The interlocking tongue-and-groove edges should be fitted together as tightly as possible without scooping the mastic up and into the joint. Complete all of the whole blocks first, on both sides of the room, leaving the edge pieces and cork strips until last. These must be individually cut to fit at each point since the room may not be perfectly square.

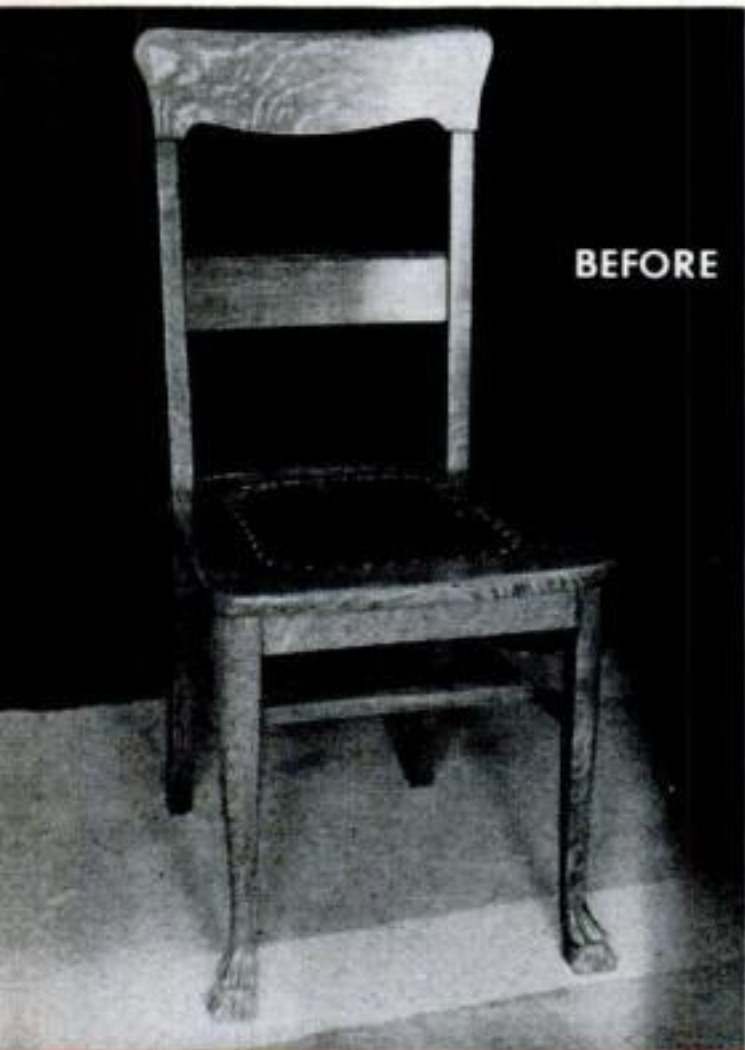
### **For a real eye-catcher, try a diagonally laid pattern**



**LAY OUT CHALK LINE** at  $45^\circ$  by striking the four  $45\frac{1}{4}$ " arcs with string and joining the points. Allow 10 percent more blocks for waste at edges. Cork strips must back up the edge pieces (left) so that they can't loosen.

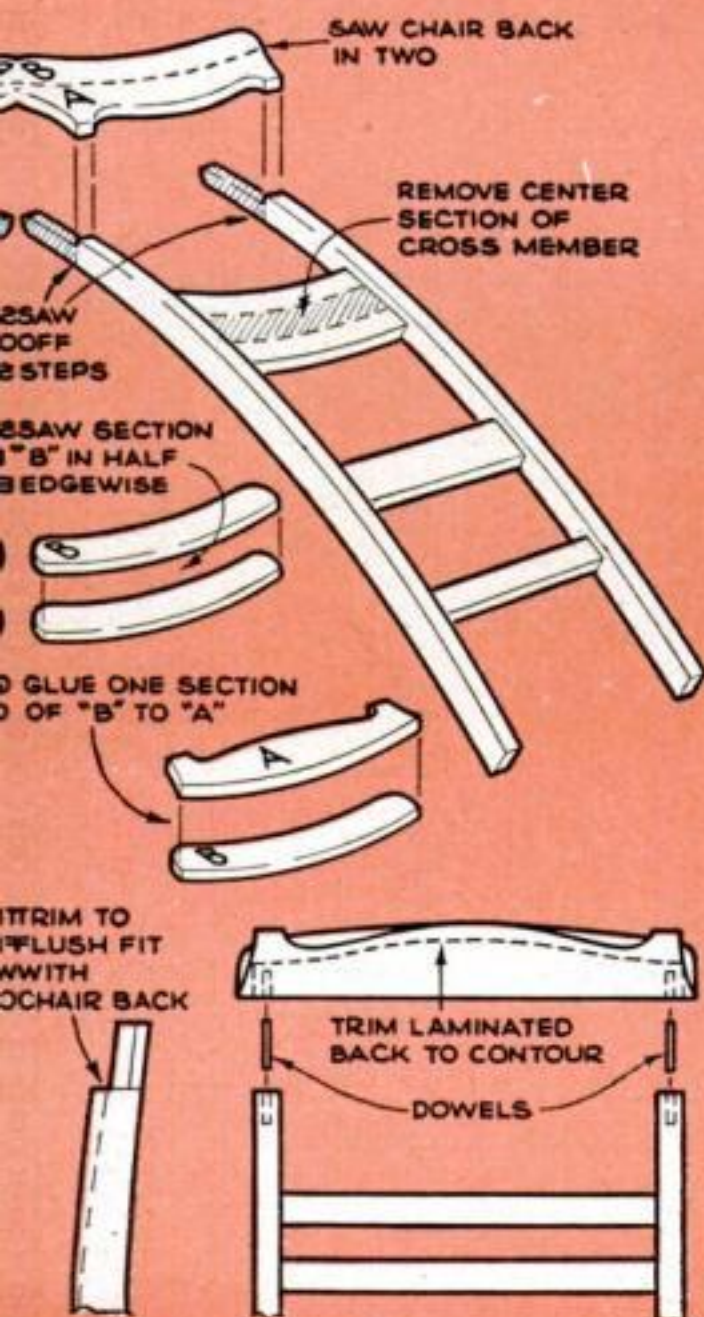


# Old Chair Goes Modern

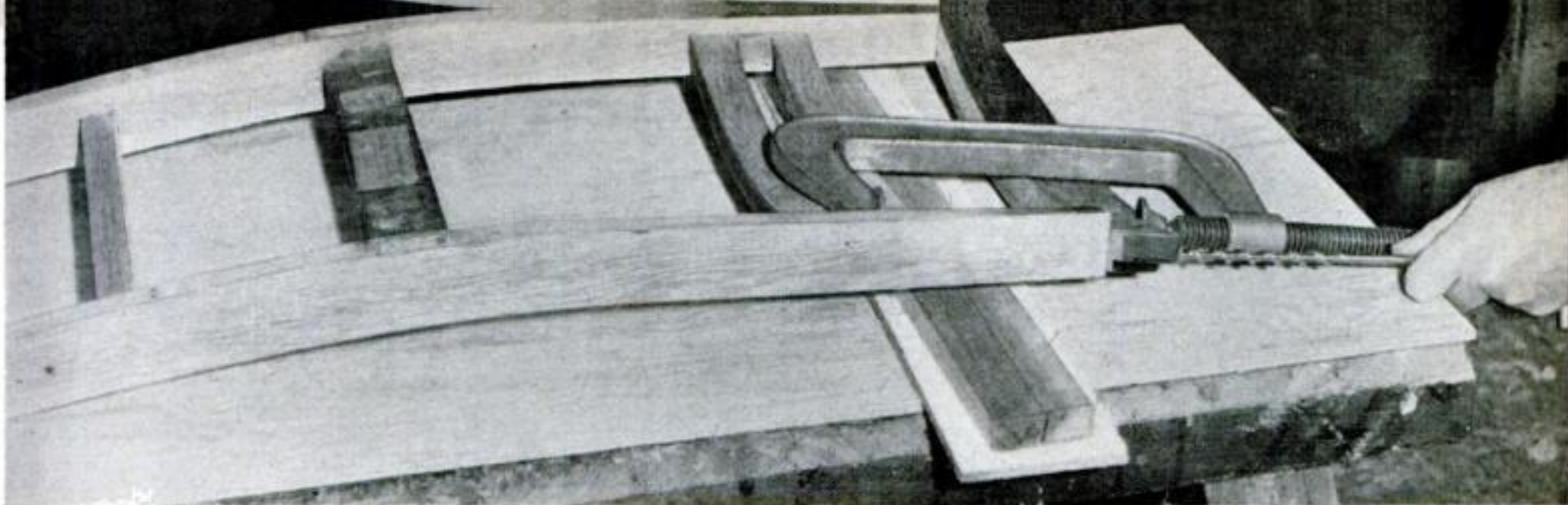


**BEFORE**

**AFTER**







**SETUP FOR DRILLING DOWEL HOLES** through the top cross member of the chair back and into the uprights is shown above. Insert a dowel pin in the first hole before drilling the second.

**By Edward R. Lucas**

**A** FEW hours of work and a couple of dollars' worth of upholstery will change an old golden-oak monstrosity into a chair that is both comfortable and contemporary in style.

Your old chair may not look exactly like the one at the far left, but it probably has the same awkwardly high back and clumsy cross members.

**Revamping the back.** First, turn the chair upside down and remove the seat by backing out the screws in the rails. Then take the screws out of the small, diagonal rail braces at the rear. Free the rear frame assembly (uprights and cross members) from the rest of the frame by placing a backing block against the inside faces of the uprights at the joints and striking sharply with a mallet.

If there is a heavy cross member midway up the chair back, convert it into two narrow cross members by drilling holes as shown in the drawing and clearing out the center section with a key-hole saw.

Next, remove the top cross member and saw off the stepped-in sections of the uprights. Rip the cross member down the center with a bench- or hand-saw. Then halve section *B* edgewise (see drawing) with a jigsaw.

Glue one of the resulting *B* sections to the back of the *A* section. When the glue has set, plane down one of the long edges of this laminated unit and join it



**UPPER SECTIONS** of the uprights may have to be trimmed for a flush fit with the top cross member. A board nailed to the workbench keeps the chair back from creeping while you work.

to the chair-back uprights with  $\frac{1}{4}$ " dowels and glue. Then trim the ends of the cross member and saw the top to a gently curving contour. If the front chair legs have ornamental feet, you may want to dress them down to smooth contours with a spokeshave.

Scrape and sand the old finish from the back assembly and the remainder of the frame before gluing and screwing them together again. Apply a blond oak finish.

**Upholstering.** To upholster, cut a piece of  $\frac{3}{4}$ " plywood slightly larger all around than the outside dimensions of the chair rails. Notch the rear corners of this seat panel for the chair-back uprights. Cut a sponge-rubber pad to panel size. Lay upholstery material face down, and place the pad and panel on top of it. Drawing the material taut over the edges of the panel, tack it to what will be the underside of the plywood. Attach the panel to the chair rails, using the original screw holes.

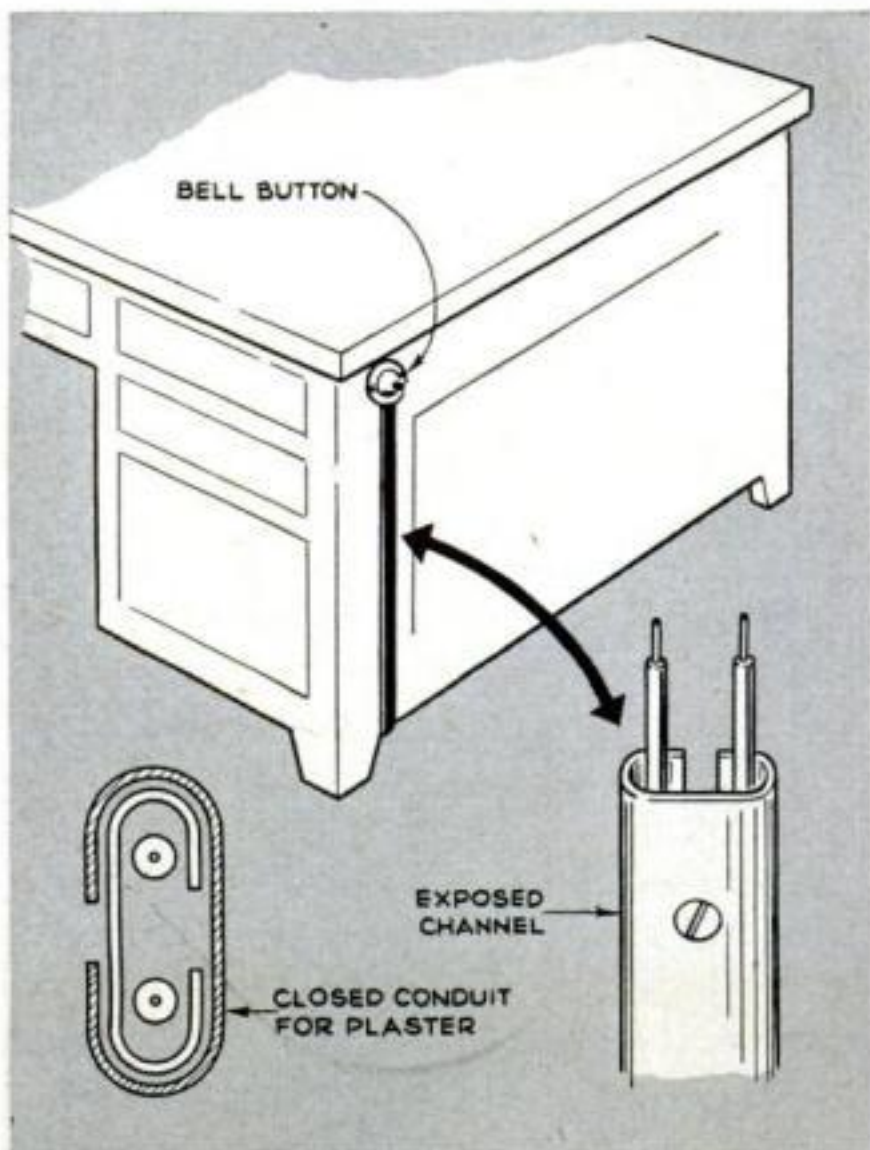
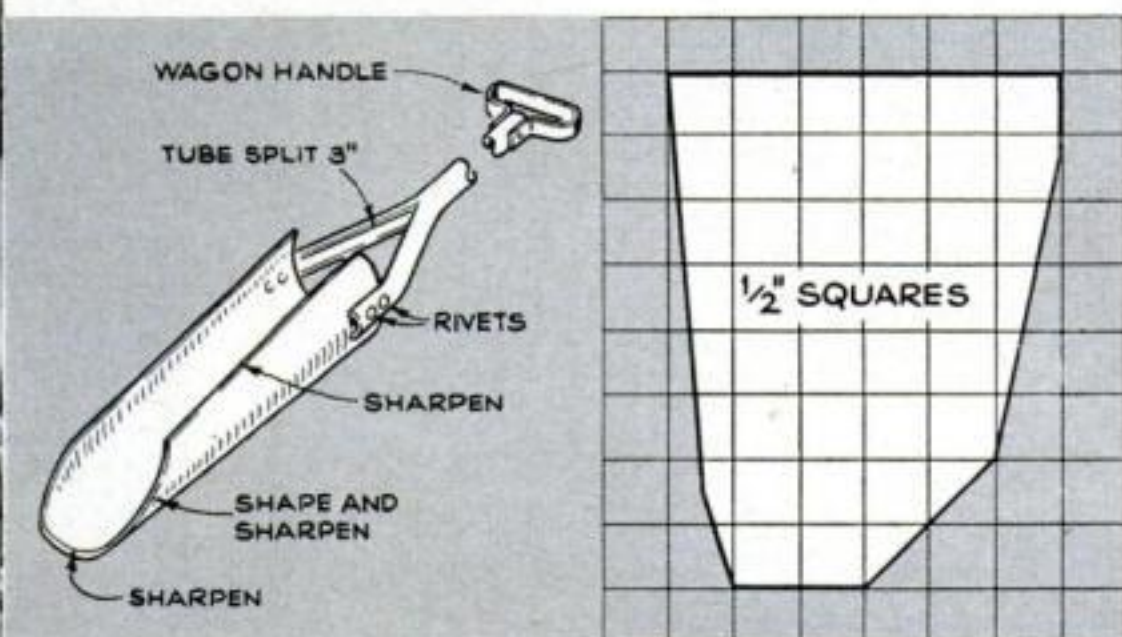
END





## Sink Drainpipe Makes Garden Tool

WHEN I put in a new sink trap, instead of discarding the old brass pipe I cut off 4" for a tool to weed dandelions and transplant seedlings. I hacksawed it to shape, filed the edges sharp, and riveted on a 12" length of metal from a child's wagon to serve as a handle, split as in the drawing.—Barney Slawson, North Topeka, Kan.

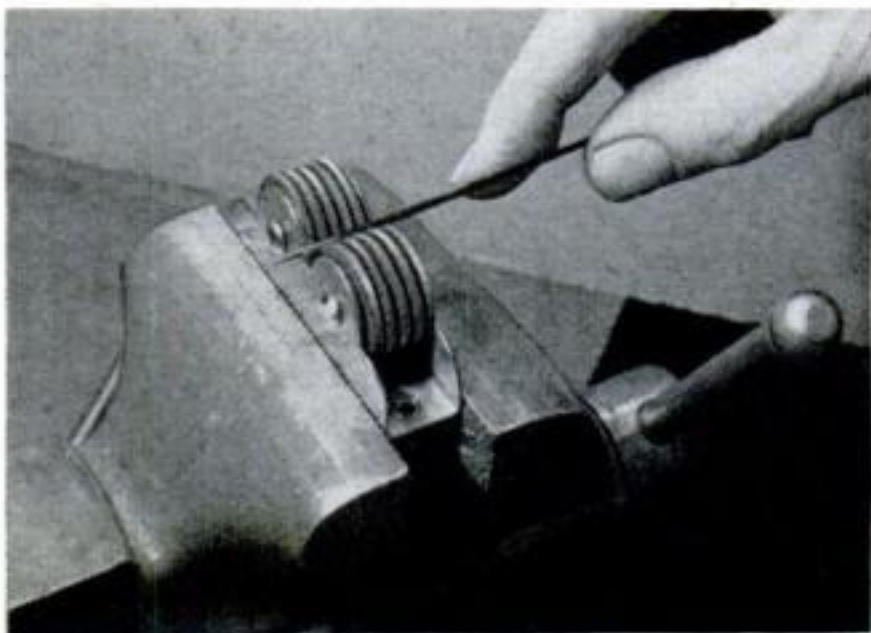


## Curtain Rod Conceals Wiring

ONE section of telescoping curtain rod will make a decorative channel for low-voltage signal or bell wires. Punch holes in the rod for screws. For closed circuit in plaster or concrete, telescope two sections as in the drawing above.

## Plastic Spray Preserves Files

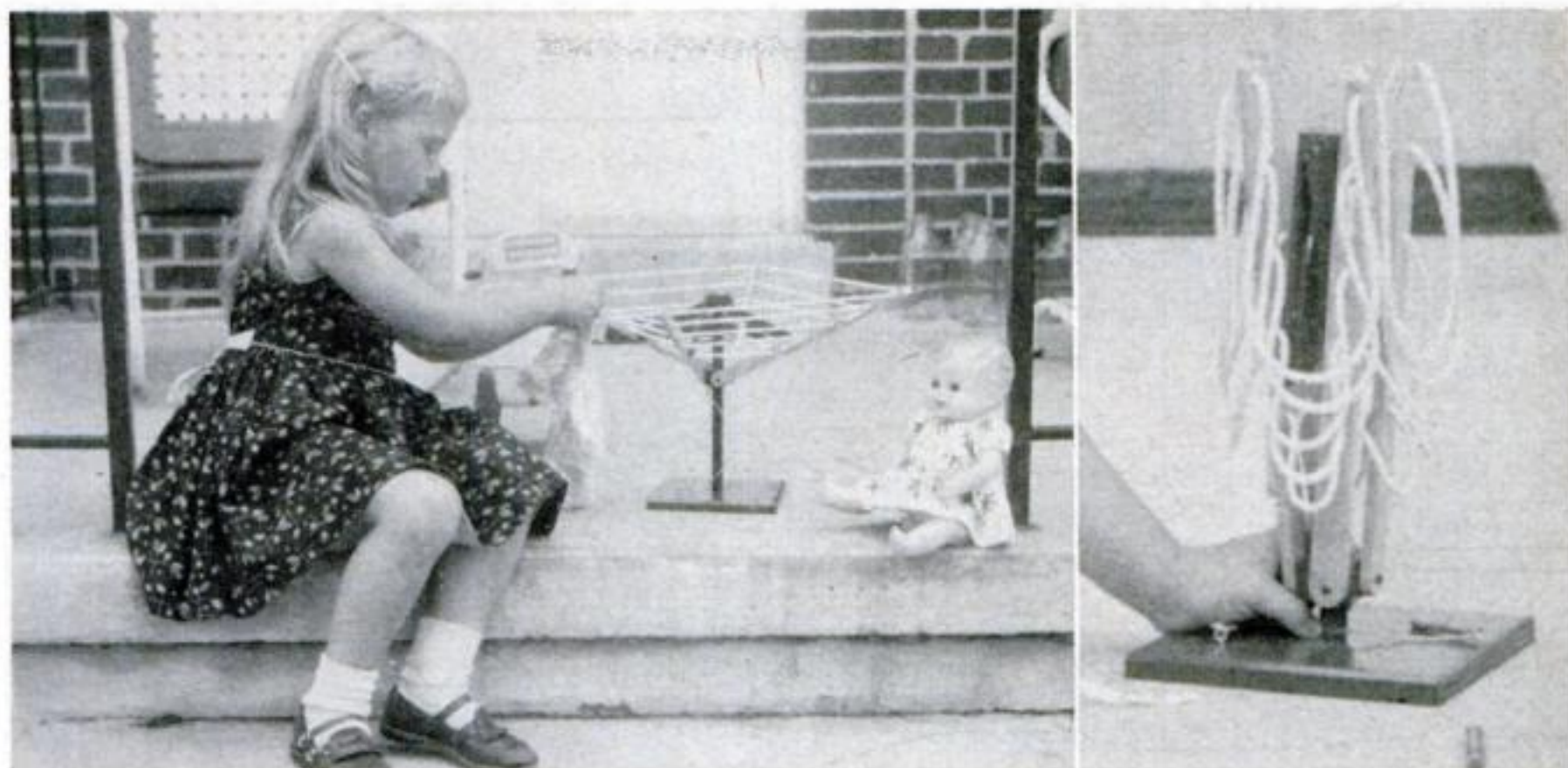
I HAVE found that plastic sprayed over the teeth of my files keeps them from clogging or rusting. The film rounds out fine crevices so that filings can't pack in. Files cleaned thoroughly before spraying need only an occasional brushing.—Noble D. Carlson, Wickliffe, Ohio.



## Knife Sharpener De-Rusts Metal

A DIME-STORE knife sharpener clamped in a vise is a handy device for scraping rust off wire and rods. It requires only pulling the material over the steel wheels. The sharpener will also shave or chamfer dowels and thin strips of wood. Rotating the disks dislodges the shavings.



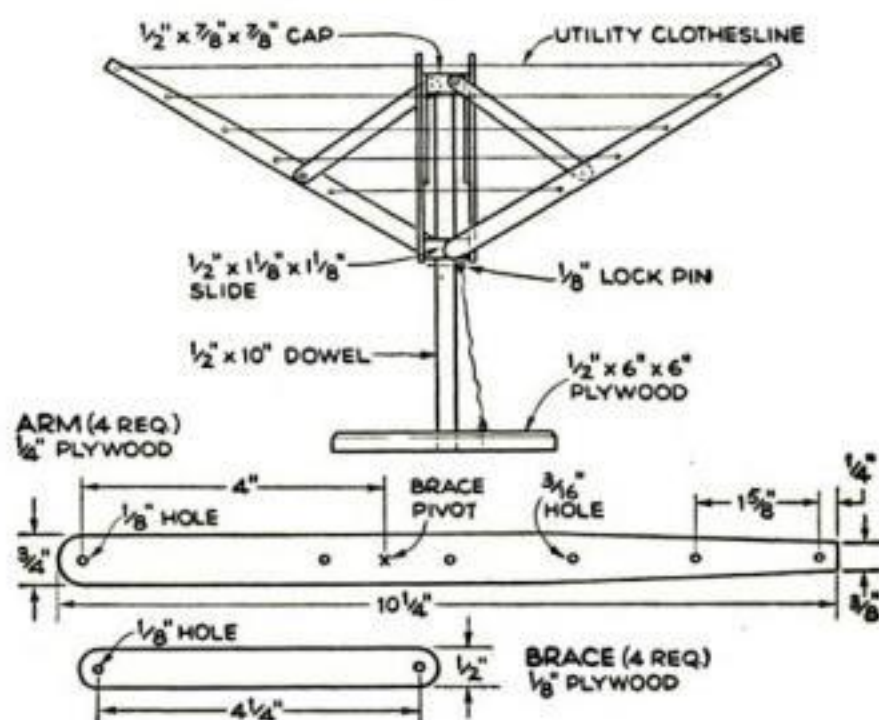


## Dryer Solves Playtime Wash Problem

WE USED to find doll clothes strung all over the house each time our little girl had a playtime wash day. But no longer. She now delightfully sets up the little dryer I made—and her playmates' dads are busy making duplicates.

The main post, a 10" length of  $\frac{1}{2}$ " dowel, is glued in a hole in the center of the base, a 6" square of  $\frac{1}{2}$ " plywood. Four  $\frac{1}{8}$ "-plywood braces are attached to a  $\frac{7}{8}$ "-by- $\frac{7}{8}$ " square of  $\frac{1}{2}$ " plywood drilled and glued to the top of the post. Four  $\frac{1}{4}$ "-plywood arms are pivoted on the edges of a  $1\frac{1}{8}$ "-by- $1\frac{1}{8}$ " square of  $\frac{1}{2}$ " plywood. This square has a  $\frac{9}{16}$ " hole in the center so that it can slide up and down the post to open and close the line. To keep the dryer open, a  $\frac{1}{8}$ " dowel is put into a  $\frac{5}{32}$ " hole in the main post at a 5" height.

After painting the parts, I used small roundhead screws and washers to fasten the braces to the arms at the pivot points, the arms to the slide, and the braces to



the upper cap. All joints pivot freely.

The utility clothesline that I used is smaller in diameter than the usual stuff. To lace the line in one piece, drill an extra set of  $\frac{3}{16}$ " holes in one of the arms, placing each hole  $\frac{1}{4}$ " below the original hole. Then start the lacing at the bottom hole in this arm.

Tiny clothespins are available in dime stores.—John G. Voelker, Towson, Md.

## Pliers Crimp Shortened Stovepipe for Easy Assembly

A PAIR of longnose pliers will help you put a new crimp in a piece of stovepipe if, in shortening the pipe, you had to cut the old crimp off. Mark the pipe for an even crimping line (or tie a piece of string around it), and grip and roll the pliers in one direction only.—J.C. Branstetter, Colma, Calif.

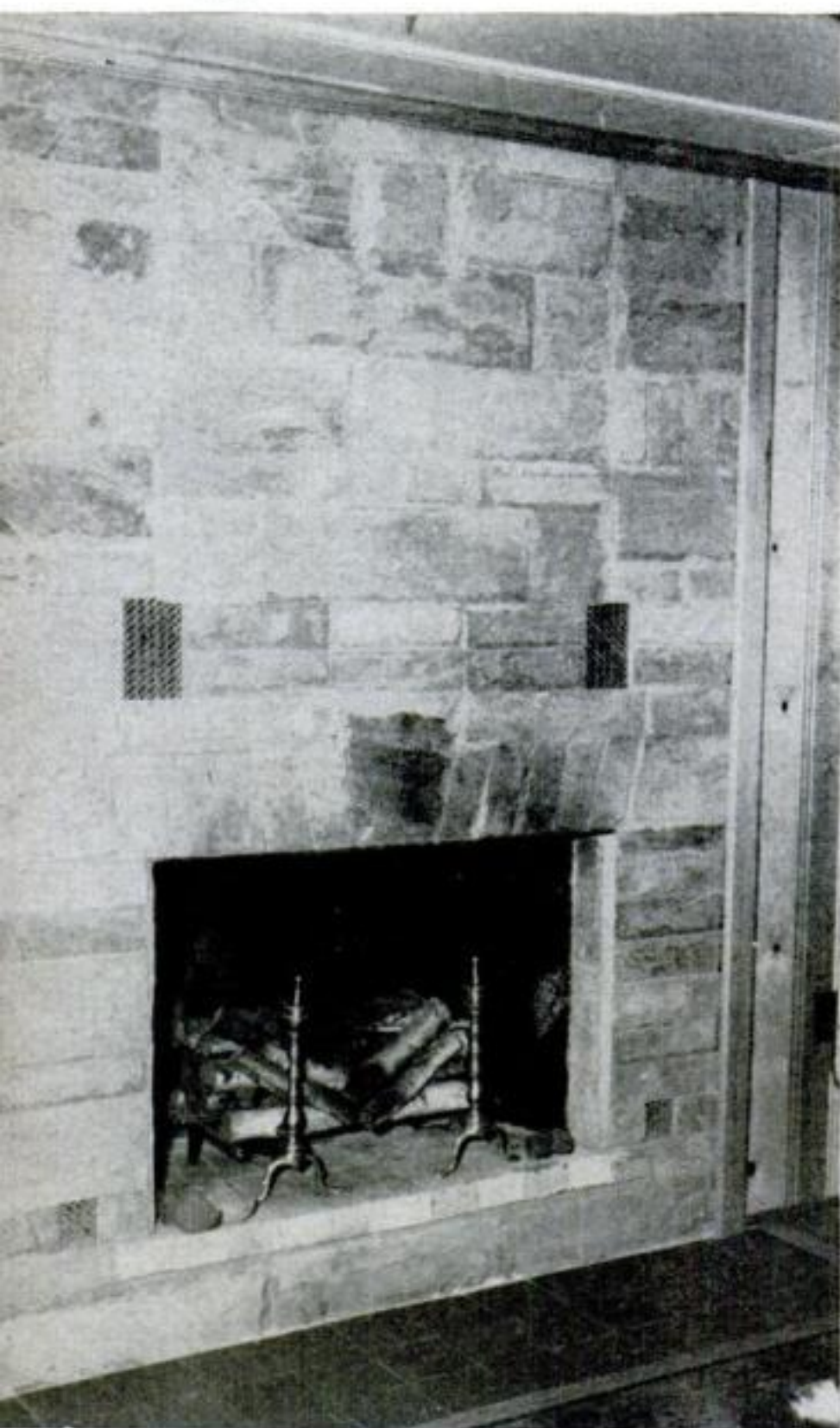




# Mail-Order Stone Makes Anyone a Mason



**BOXED FOR SHIPMENT,** veneer stone is packed in assorted shapes, 10 square feet to a carton.



**HANDSOME FACING** on this fireplace wall gives luxury look to the room, yet costs little. Stone used, about 35 sq. ft., would cost around \$60, including shipping charges.

**YOU CAN ADD A STONE FRONT** like the one at right without a foundation or masonry work. Pieces can be screwed to any smooth wall or to sheathing with shingles removed.

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**S**TONE walls now come in packages. You can mail-order boxes of trim, precut, colorful stone that can be put up in a few hours over almost any wood, plaster or other even wall surface.

The stone is real, but is sliced thin—from  $\frac{3}{8}$ " to  $1\frac{1}{4}$ " thick—so that it adds little extra weight and requires no footings, framing or bracing. You don't cement it up, either. You *screw* it up. The top and bottom edges of each piece of stone are grooved to lock into special metal clips that are first fastened to the wall.

The screws are self-tapping and hold even in brick and other masonry when inserted in pre-drilled holes. On crumbly surfaces like plaster and plasterboard, low-cost plywood sheathing is screwed to the wall studs first. After the stones have been placed in position, the gaps are filled in with grout to give the appearance of mortar.

The grout can be a rich mortar mix of one part lime, one part cement and two or three parts fine, washed sand. This will give you crisp white outlines around the stones. You can also tint the grout by omitting the lime and mixing in dry concrete coloring powder to the







**MASTIC** can be used to give you a "third hand" to help hold stones as you fit them in place.

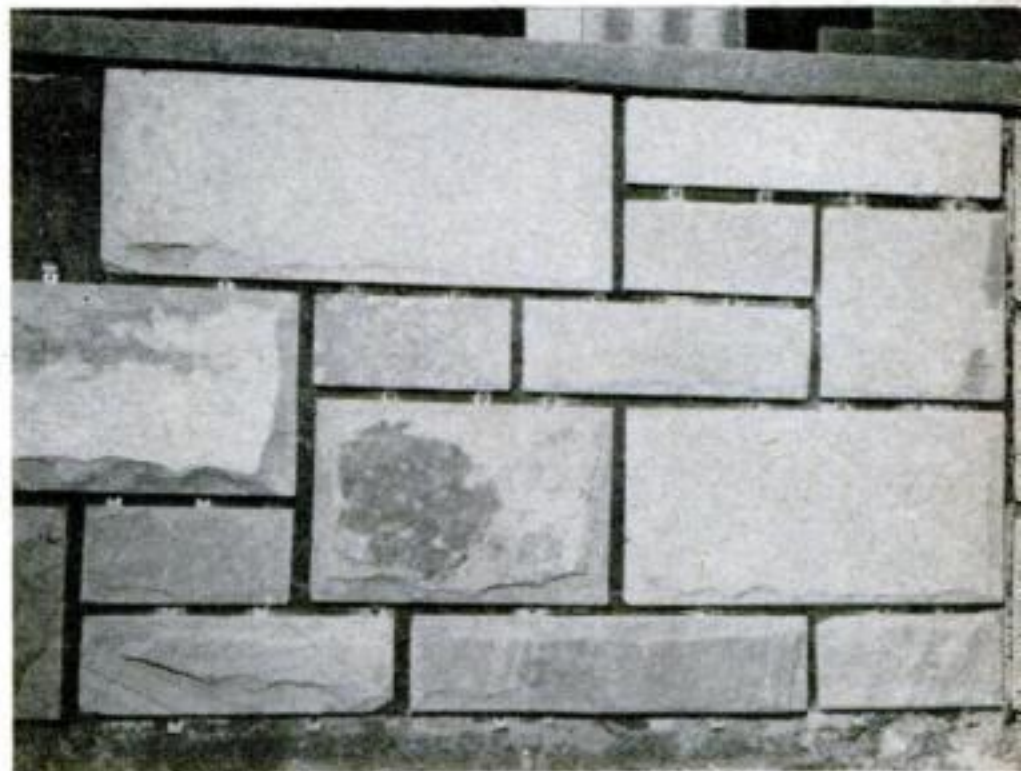
desired tone before adding the water.

Veneer stone\* comes in several types—bluestone, Tennessee stone and Grand Canyon natural stone—for about \$1.50 a square foot. Assorted sizes in multiples of 4" up to 8" high and 20" long let you arrange random-looking patterns that fit perfectly without cutting. The pieces are rough faced but are sawed smooth on the backs to lie flat.

Packaged sandstone†, another type of mail-order stone, comes in 3½" widths and is laid flatwise, like bricks, with a ½" bed of mortar between courses. With sandstone, you can face surfaces or build free-standing walls for gardens, plant boxes, and barbecues. Their extra weight, however, requires footings outdoors and bracing of floor joists indoors.

The sandstone is available in an assortment of soft pastel colors and is ordered by the square foot of face coverage in the same way as the veneer stones. A ton covers about 45 square feet and costs around \$30.—*Paul Corey, Sonoma, Calif.*

\*Allegheny Natural Stone Co., 1233 Belmont Ave., Paterson, N. J.  
†The Briar Hill Stone Co., Glenmont, Ohio.



**METAL CLIPS**, screwed to the wall first, provide automatic ½" spacing between stones as pieces are built up one atop another. Space is later filled in to look like real masonry.

**AT CORNERS**, stone is ordered mitered 45° at edges so that pieces fit neatly together. Corner cracks are sealed with gray calking compound before the joint gaps are filled with grout.



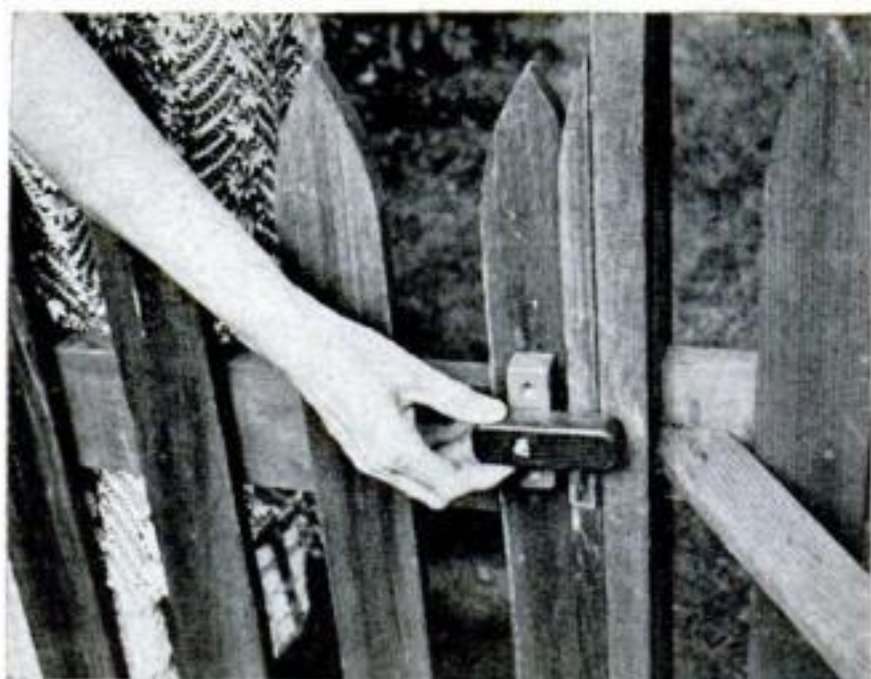




## Junked TV Antennas Formed into Handsome Porch Railing

PARTS from junked TV antennas were used to form this decorative porch railing. A mast became the end post and aluminum-tubing arms the crossed balusters. They were flattened slightly and drilled at center to take a rosette-like

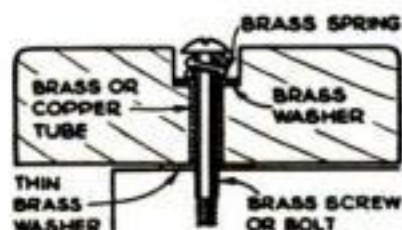
combination of washers and a bolt, as shown above right. Two-by-threes were used for top and bottom rails through which the mast was inserted. The tips of the tubes were flattened and screwed on.—*Bob Johnson, Lakewood, N. J.*



## Old-Style Latch Is Improved

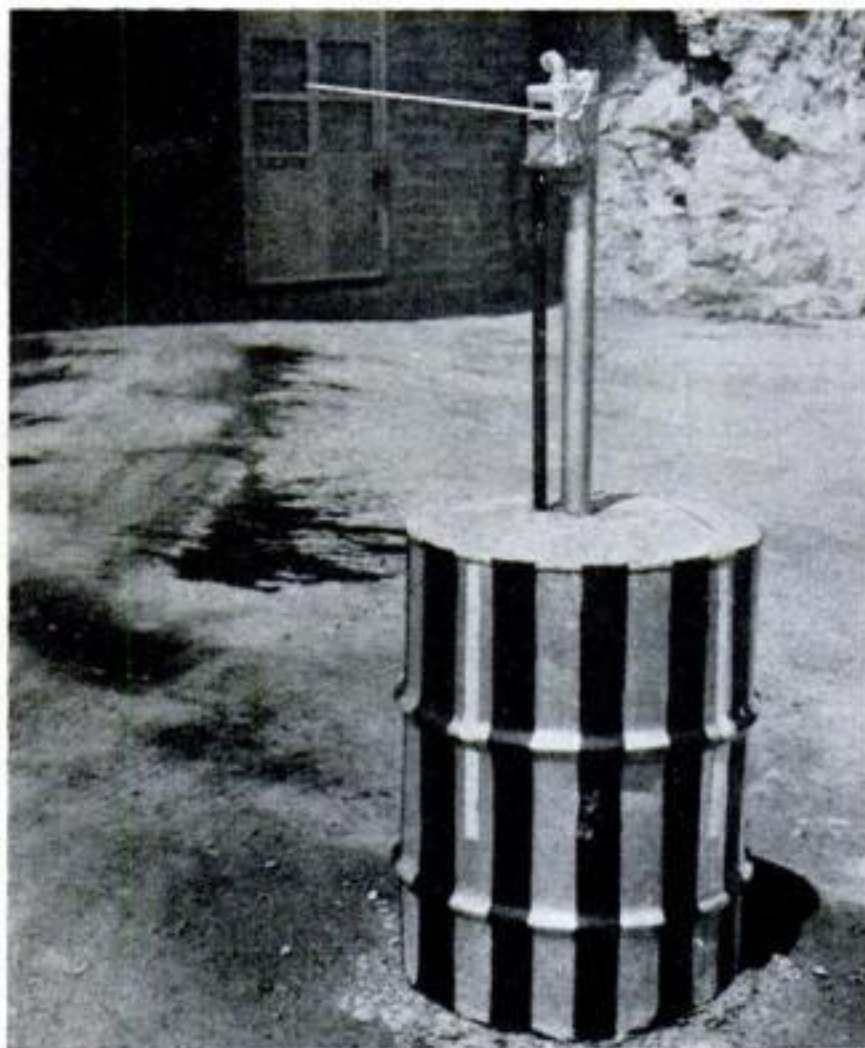
A FEW pieces of hardware will make the old-fashioned button latch a reliable piece of machinery. Yet it still works as simply and looks as rustic as ever.

This de luxe job has a bit of metal tubing lining the screw hole to make a bearing. A washer under the button reduces drag, and a coil spring and washer under the screw head hold the button in position. Use brass or copper for all metal parts.



## Barrel Protects Yard Switch

TO PREVENT damage to an outside door switch operated from truck cabs, a farm near Valmeyer, Ill., protects its pipe standard with a concrete-filled barrel. Contrasting stripes plus reflecting strips warn drivers to keep their distance.

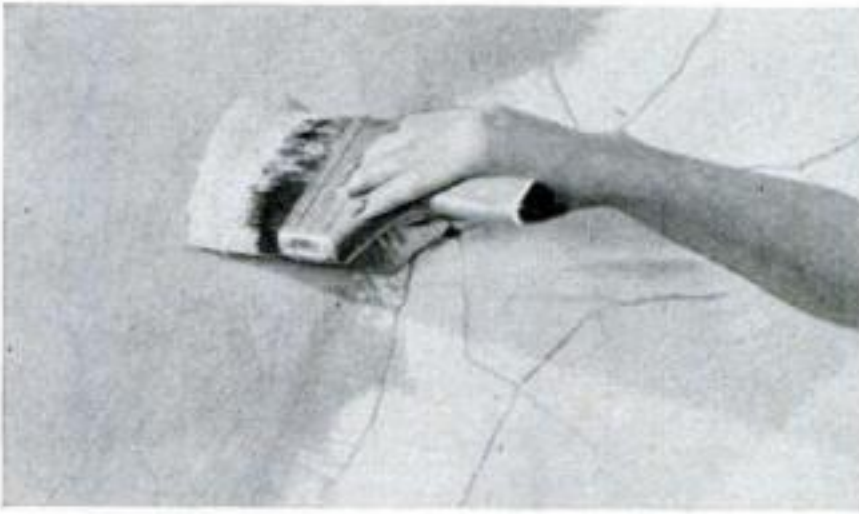




# New for the Handy Man



**1. Walls Snap On.** You can put a new wall over an old one, or on studs, by inserting wood, metal or hardboard panels into a double-grooved aluminum channel (top piece in inset). This strip is then pressed into the flat-backed piece which has been nailed on studs. Any panel can be replaced. Edging and corner pieces are available.



**2. Paint Also Patches Wall.** This paint and plaster combination fills cracks on a wall as you paint. It can be applied with a brush or roller on plaster or wall-board and comes in 12 colors.



**3. Wallpaper Tool Does Triple Work.** You can cut, trim or smooth wallpaper seams with this one-arm paperhanger. A toothed blade makes neat cuts at corners, a trimming wheel shears off long pieces, and the wood roller presses seams down.



**4. Fir Plywood Has Plastic Face.** Fir plywood panels are now available with one- or two-side plastic surfaces that take paint without showing grain. You can use them to make furniture, over wall studs, or as siding since they are also weatherproof. Sheets are 4' by 8',  $\frac{5}{16}$ " to  $\frac{3}{4}$ " thick, and also come in special sizes.

*More information about the products on this and the following page can be obtained from: 1. Erdle Perforating Co., 171 York St., Rochester, N.Y.; 2. The Reardon Co., 7501 Page, St. Louis; 3. Hyde Mfg., Southbridge, Mass.; 4. U. S. Plywood, 55 W. 44 St., NYC; 5. Gate City Sash & Door, Fort Lauderdale, Fla.; 6. The Camp Co., 6958 S. State St., Chicago; 7. Home Building Plan, 2454 N. E. Sandy Blvd., Portland, Ore.*

**Please turn the page for more handy-man tips**

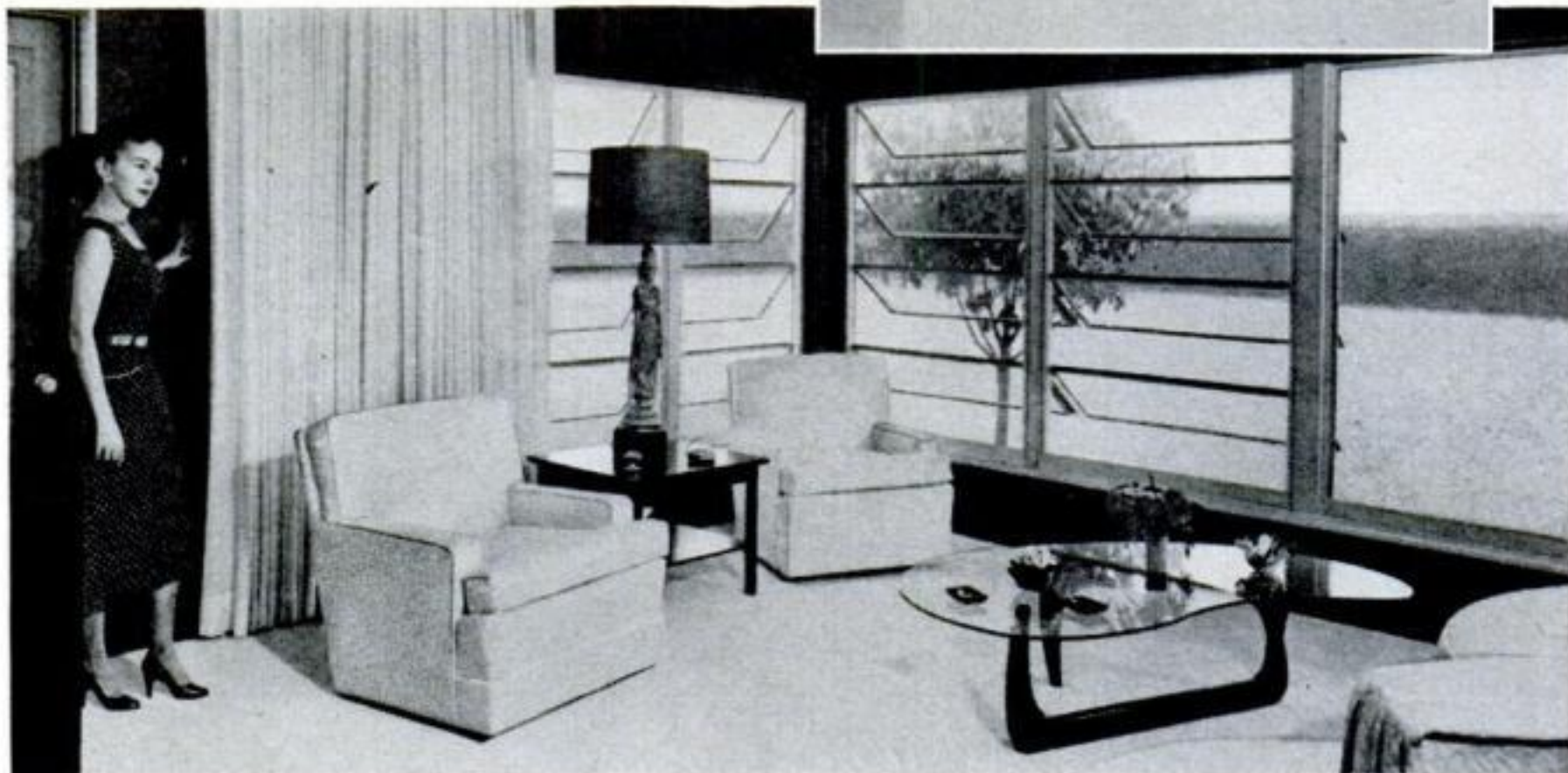
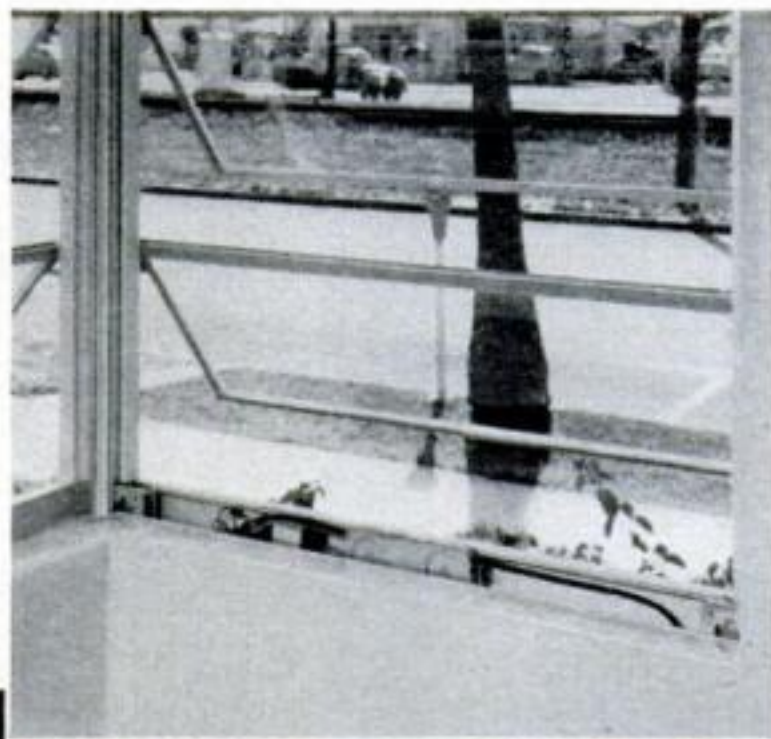
**MAY 1956 201**



## More Handy Man Tips

### 5. Remote Control Operates Windows.

You flick a wall switch and a neat electrical unit that you can install in a window sill opens or closes awning windows. It can be wired to control them individually or simultaneously from anywhere in the house. The unit works like the push-button device on automobile windows. A 1/6-hp. motor operates it. If power fails, manual control is possible.



**6. Terrazzo Flooring Poured On.** A latex-base mixture that you trowel on produces the effect of a terrazzo floor. It can be spread over either wood or concrete and finished by sanding or grinding.



### 7. Blueprints Outline Plumbing System.

A set of three blueprints shows in detail every piece of plumbing in the average house. They also contain instructions listing the equipment and material needed to make repairs and show how to rough in plumbing for dishwashers, laundries and other household installations.





# Keeping the Home Shipshape



**TO DEFROST FAST**, reach for your vacuum cleaner. After removing the contents of the freezer or refrigerator, blow in the air. The warm blast will melt the accumulated ice coating in jig time.



**ROUGH-SEAMED WORK GLOVES** will be more comfortable and less likely to cause blisters if you turn them inside out, to put the seams on the outside.



**UMBRELLAS A PROBLEM?** You can make a holder by punching four holes in a metal waste basket and inserting separation rods bent from coat-hanger wire as shown in the drawing above.

**TO DE-GREASE** a concrete driveway, spread a thick layer of dry portland cement over the oily spot with a trowel. When it has sopped up oil, remove it and apply a new layer. Repeat this procedure until the cement application no longer shows any discoloration.



Please turn the page for more home tips

MAY 1956 203



## More Home Tips



**SAVING EASTER BASKETS** from year to year will save you money. To keep them dustfree, heat-seal them in transparent-plastic freezer bags.



**WHEN BLEACHING** furniture, if an odor clings to the wood, seal it in with two coats of thin white shellac. Be sure to seal all cracks and joints.



**LOST A SHOELACE TIP?** Replace it with a wrapping of cellulose tape and it will thread easily through your shoe. You can color the tip with a dab of shoe polish.



**WASTE SPACE** above a bathroom fixture goes to work when you hang a wall cabinet like the one shown above. Start with an unpainted bookcase, and you need only add plywood sliding doors.

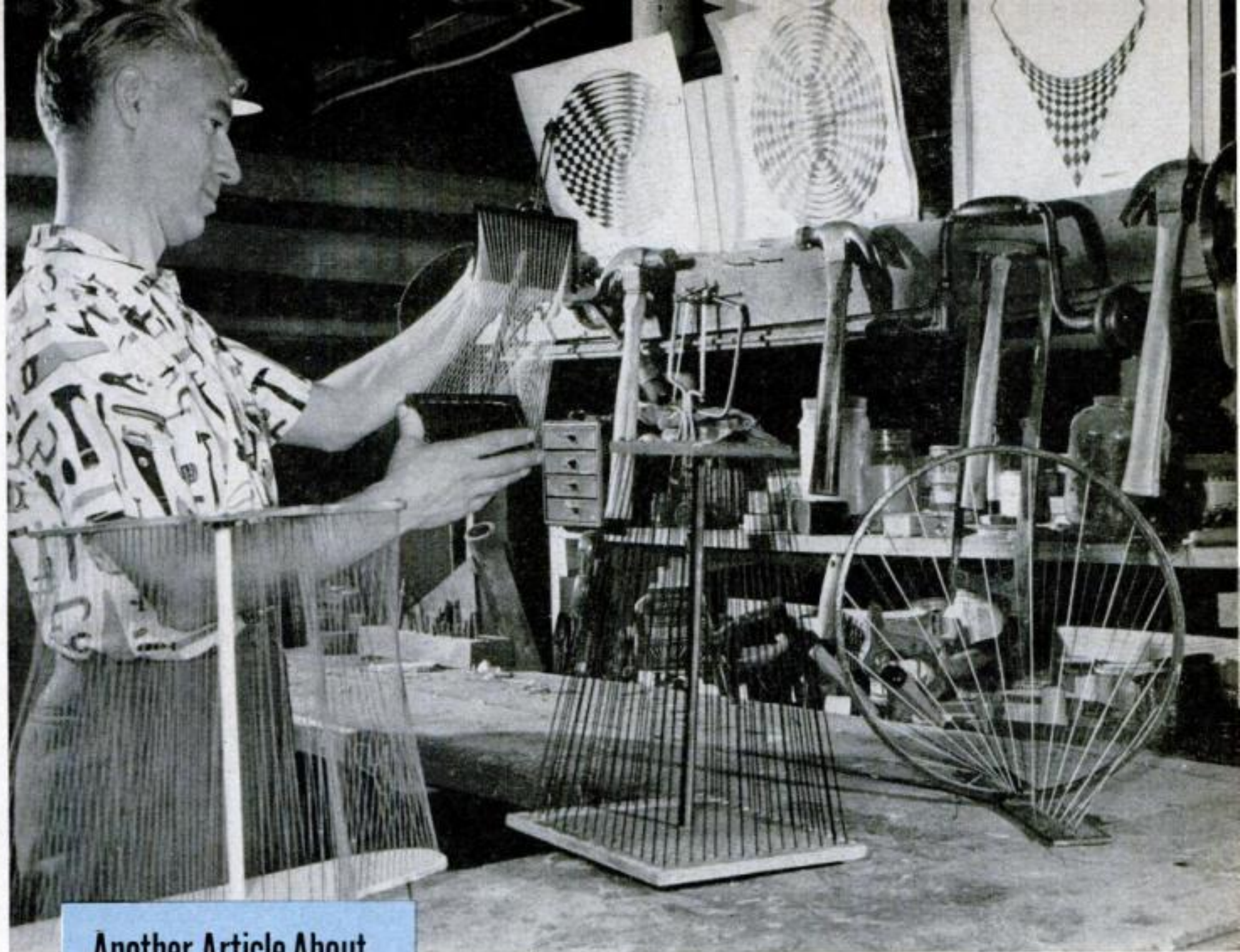


**INDOOR WINDOW BOXES** can be fancied up with little work by adding borders of plastic shelving. Pick a color that blends with the room decoration, and tack the border in place.



**A BRUSH WIPER** for a paint can is quickly made from a strip of tin. Four notches are cut so that when the strip is folded in half lengthwise it will fit over the lip of the can, well toward one side.





Another Article About  
**The  
 Other  
 Fellow's  
 Shop**

# His Designs Come from Math Books

***Ernest Ranucci puts his geometry to work making designs that end up on furniture and in modern string lamps that hang in space.***

**By E. D. Fales Jr.**

**I**N A basement in Fanwood, N. J., a modern handyman has come up with a new idea.

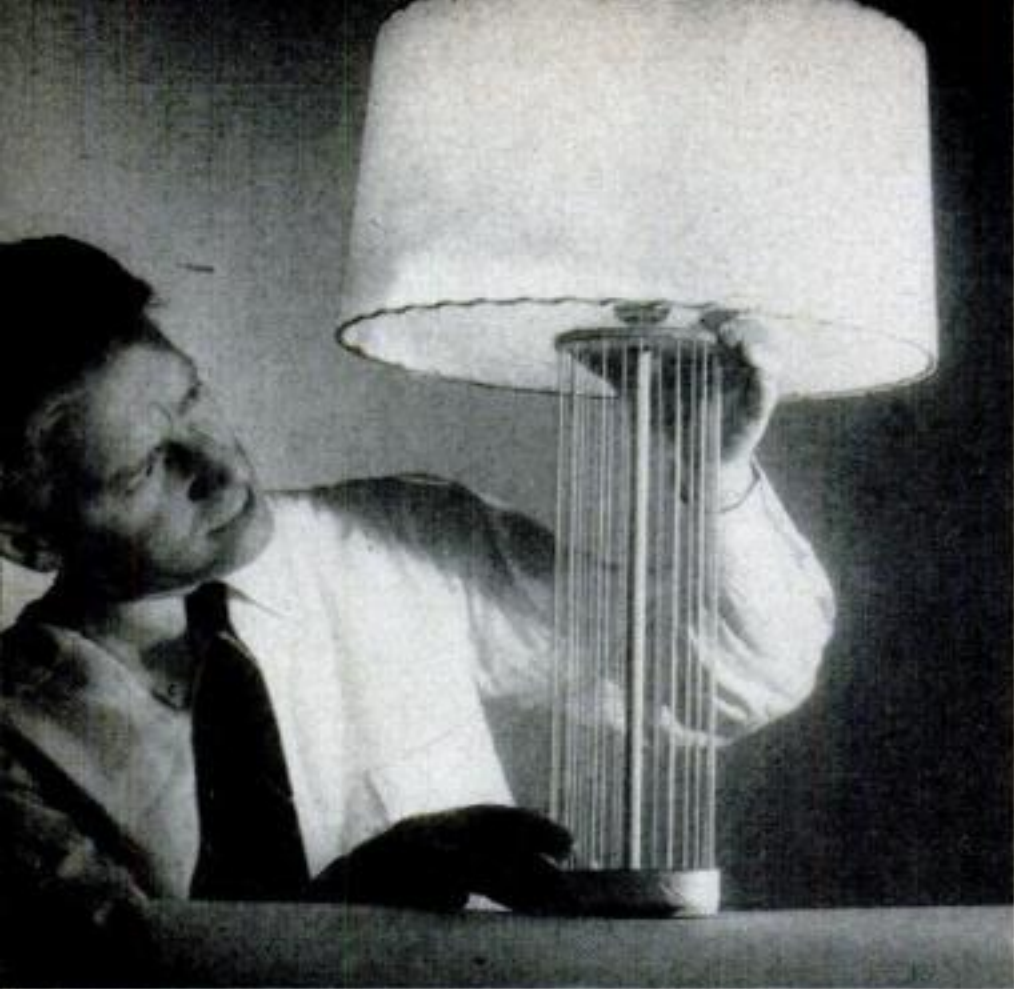
From Ernest Ranucci's workshop come modern lamps that please but (at first) puzzle you. Then you realize you're looking at the simplest of cylinders, triangles and rectangles, plus networks of crossed lines, streams of parallel lines

and strings that appear to be curved—but aren't.

***It's pure geometry.*** You see, Ranucci teaches (and broadcasts on TV) something called "visual mathematics." And he's brought geometry to his workbench.

It's an idea that's long overdue. It's dead sure to stimulate you to produce objects and designs that you never thought of before. (Some, frankly, you'll never want to think of again.) "You'll





**TO CHANGE SHAPE** Ranucci loosens nut over top disk, twists base. Curves appear but each strand stays straight. Top disk:  $\frac{3}{8}$ " plywood; bottom: 2 disks glued together after insertion of heavy lead slug in lower one. (Slug  $\frac{1}{4}$ " thick can be poured in a juice can.) Cording is a continuous strand run through  $\frac{1}{16}$ " holes. A light-fixture rod serves as the backbone.

spend hours of work and come up with some wonderful lemons," Ranucci says. "But soon you'll come up with *good* ideas, too."

Look what happened to Ranucci. The worst lamp base he's made is a horrible mixture of simple geometry and "free form"—rendered in string and plywood. The best is an eye-stopping lamp built of—well, mostly it's just space surrounded by strings.

**Ordinary string won't do**, because after Ranucci's lamps are made he twists them into the right curve for the right room. Ordinary string wouldn't give enough to twist into such shapes.

.....  
*This is one of a series of articles about noteworthy home workshops. See POPULAR SCIENCE MONTHLY next month for a story on another fellow's shop.*  
 .....

If Mrs. Ranucci hadn't been making a dress one day his lamps might never have been made.

"She was using string that stretched," Ranucci says. "She called it 'elasticized thread.' I swiped some. It was  $\frac{1}{16}$ " cotton cord with tremendous stretch. I could stretch one foot into two."

With this kind of cord Ranucci could make the twist-lamps that he'd been thinking of as a workshop project.

The good things about his lamps are:

- You can see right through the base. That makes any room look larger.

- You can change the shape at will. Loosen the lock nut at the top and twist the whole structure. A square base that might look "boxy" in some living rooms can be twisted into neat hyperbolic curves. (If you keep on twisting you suddenly find yourself holding two pyramids—and they look good, too.)

- They're cheap. A base with a \$20 look can be built for 50 cents. That in-





**BIG KNOCKDOWN FRAME** of dowels (joined with wire and screw eyes) was made for a school play. Ranucci is twisting lamp made with two

plywood squares and string. Base second from left is his free-form "lemon." Next is a "circle-on-a-straight-line" lamp-base design.

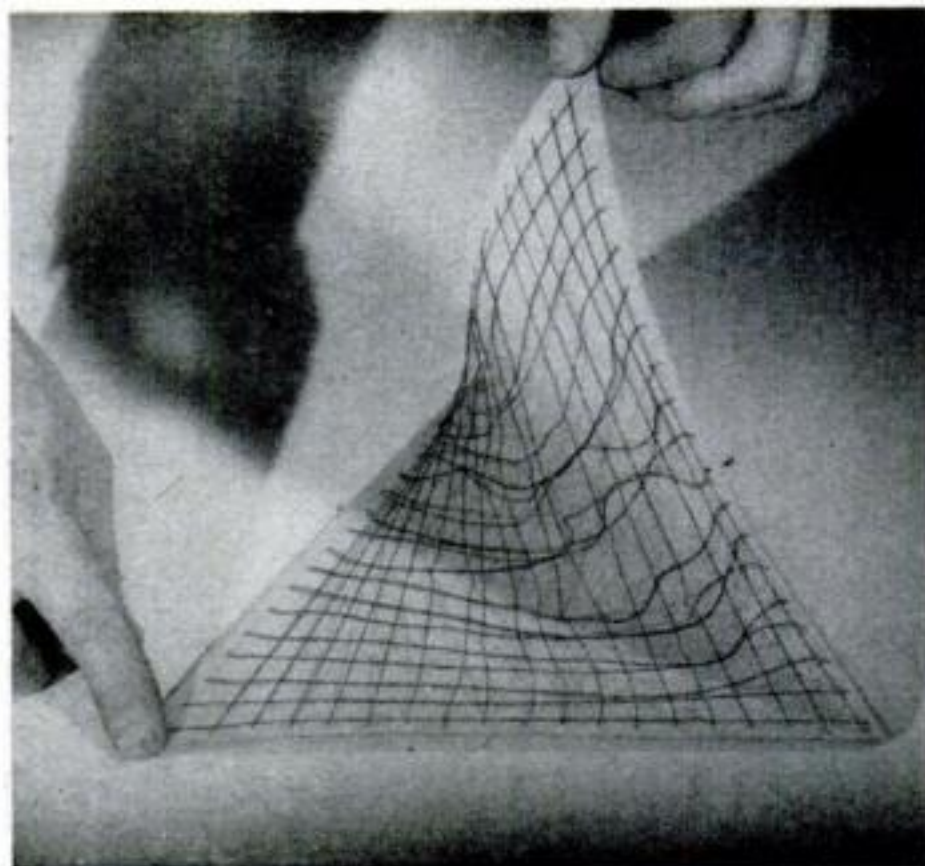
cludes plywood ends, hollow  $\frac{3}{8}$ " backbone rod, elastic cord and a lead weight in the bottom.

- They're colorful. You can dye the cord several colors and go haywire with rainbow effects. It's best, though, to keep the colors simple.

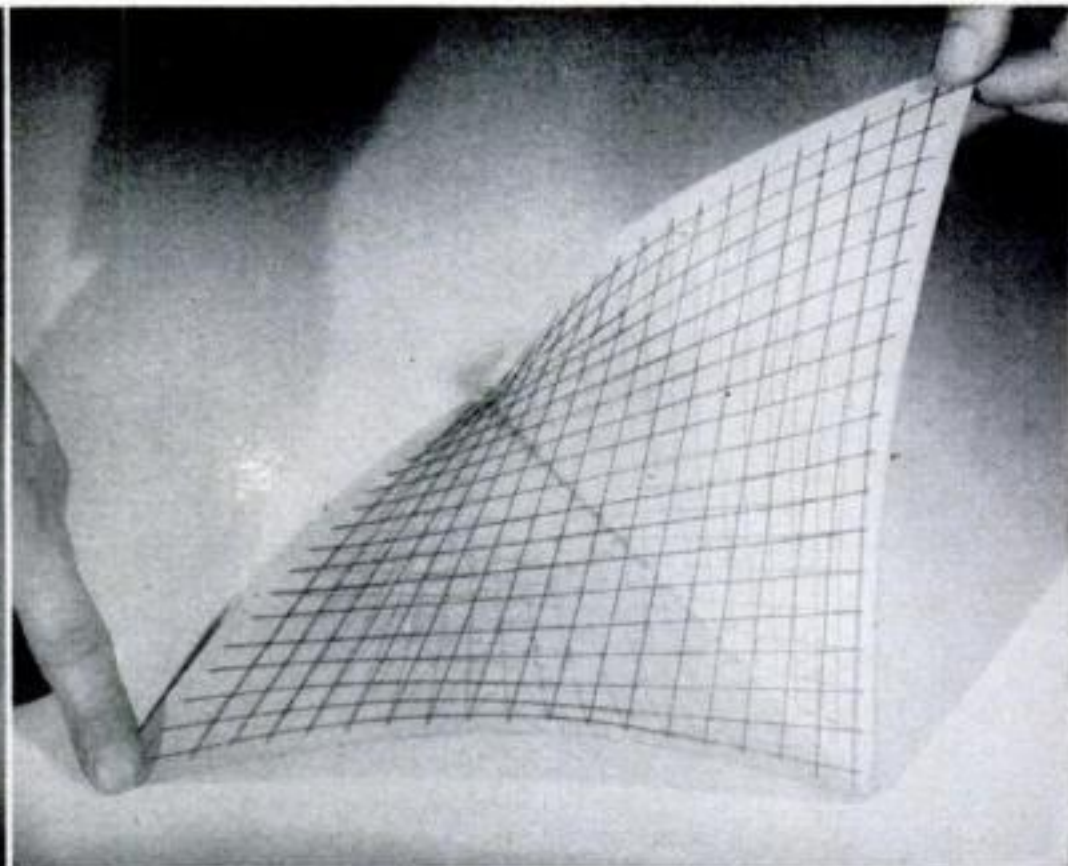
*The principal tools* needed are hand

drill, 8" saw and drill press, but Ranucci also uses this special "hardware": (1) shoemaker's needles, (2) yards of elasticized thread, (3) dividers and scribes, (4) graph paper, and (5) a pile of mathematical curves and formulas (such as  $x^2/a^2$  plus  $y^2/b^2=1$ , which is how you lasso an ellipse and get it down on graph





**"ORDER OUT OF CHAOS"** is what Ranucci calls this shop experiment. Disordered mass of strings laced through square of cardboard suddenly springs to order when tension is applied by

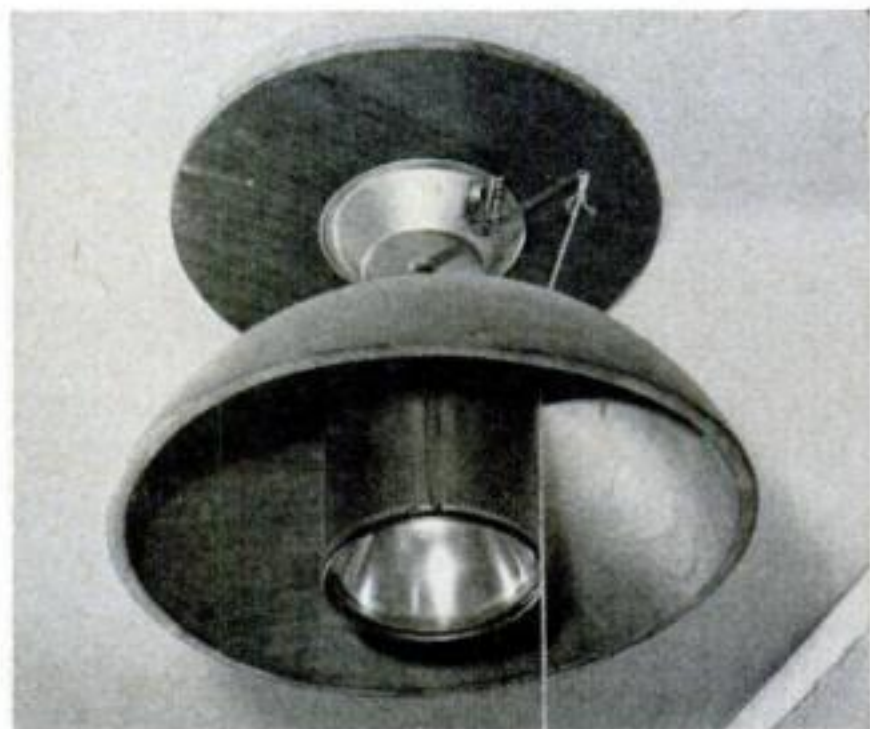


flattening cardboard. Ranucci spends hours trying combinations of line, tension and shape, often gets ideas from his students' inked-in designs shown tacked over workbench on page 205.

paper). You don't really need the math but it helps.

With this bench setup, Ranucci says, before you build something, you can reduce the basic idea to the simplest geometrical components: circles, squares, triangles, or straight lines.

"Then experiment," he says. "Cut out rough cardboard mockups, for the plywood or metal ends you'll need later. String your cord and test different tensions and torsions. Project a light beam and study the *shadows* the cords make. Even these may suggest some changes that you can make in the design."



**MIXING BOWL, PIE TIN** and a tin can provided the curves, cylinder and truncated cone that Ranucci wanted for this hallway ceiling lamp.

Next dig out graph paper and work variations until you have your design.

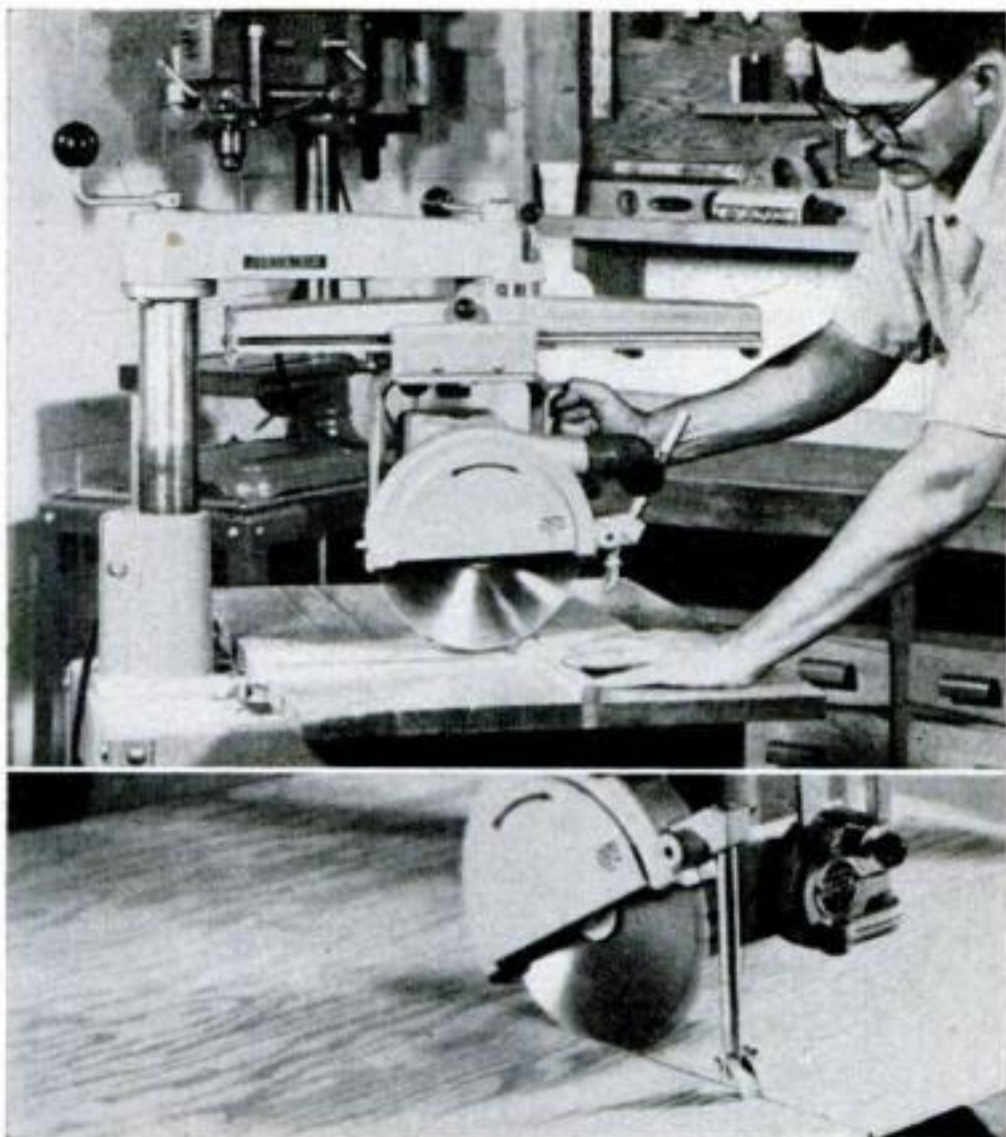
When Ranucci isn't working with cord, he may take a run down to a hardware store. "I like to see if I can do things that haven't been done before with items that you can buy for 15 cents," he says. He looks for cones, pyramids, cylinders and other interesting geometric forms.

A funnel, inverted and weighted, becomes a base for a bedside spotlight. A 22" mixing bowl becomes the shade for a ceiling lamp. The \$3.50 bowl is attached, by a light-fixture rod to a 12" plywood disc screwed into the ceiling. For a collar between the two Ranucci chose a 6" pie tin. Inside the bowl he put a modern-looking cylinder (a 5" tin can) in which a 75-cent reflectorized light bulb fits snugly. A 25-cent trip switch finished the job.

**How to develop new designs.** Ranucci thinks every shop needs a design bench. On it should be a drawing board, drafting tools, pens, India ink, graph paper, and small brushes for inking and coloring experimental patterns.

Besides construction designs you can develop new designs for *surface decoration* on such things as coffee tables, record racks, hi-fi cabinets, wastebaskets, bookshelves and wall panels. **END**





## New Tools

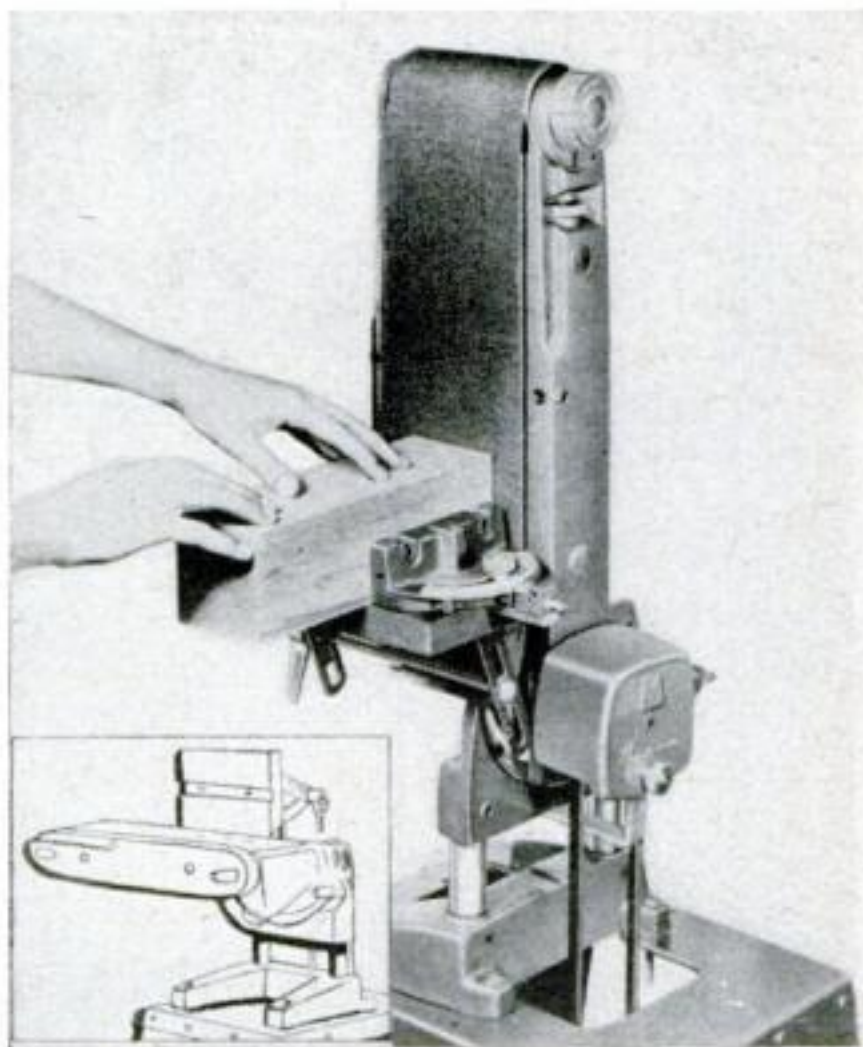
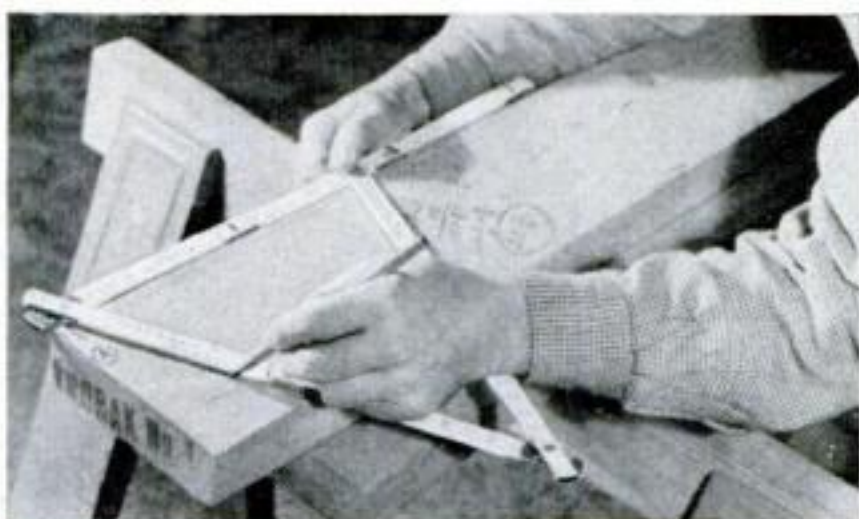
### 1. Radial Saw Has Turret Arm.

Said to be the first radial saw with turret arm, this 9" blade can be maneuvered in any direction. With it you can rip beyond the center of a 48" panel (lower photo at left), crosscut a 1"-by-15" board, cut 2½" in depth or miter. It has a built-in dual-voltage ¾-hp. motor that operates on either 110 or 220 volts. Special legs and casters are available.

*More information about the products shown on this page can be obtained from: 1. Delta Power Tools Division, Rockwell Mfg. Co., 445 N. Lexington Ave., Pittsburgh 8, Pa.; 2. Master Rule Mfg. Co., Inc., 40 Mulberry St., Middletown, N. Y.; 3. Magna Power Tool Corp., 110 Lindfield Dr., Menlo Park, Calif.*

### 2. Pocket Rule Is Framing Square.

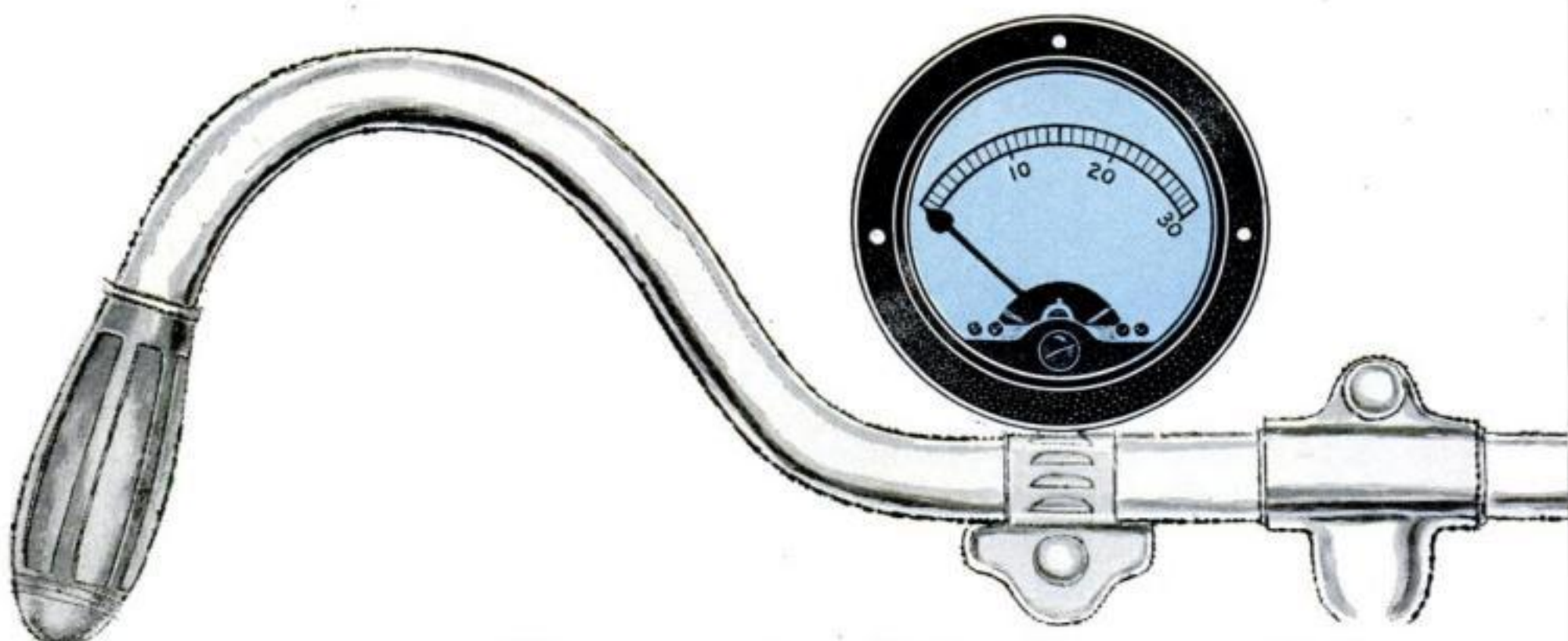
Calculations for common, hip, valley and jack rafters are prefigured on this folding rule, and the cuts are easily laid out by lining up its notched end with the proper bull's-eye, as shown below. It is marked for all top, bottom and side cuts. You can use it also for finding pitch of a finished roof, as a width gauge (by cradling a pencil in the metal notch) and as a conventional 6' linear rule.



### 3. Belt Sander Operates Two Ways.

You can use this 6" sander vertically, horizontally or at any tilt. Its universal table may be set in any position from minus 20° to plus 45°, or used as a fence (as shown in the inset). There is an auxiliary spindle on the drive drum for mounting a disk or drum sander or a polishing wheel. The sander can be used on a stand or Shopsmith power mount.





# How to Make a Bike



**USE A DRILL** one size smaller than the motor shaft to ream out a hole in wheel hub. Running

the motor on batteries, dress shaft with a fine file until the hub can just be started on it.





# Speedometer

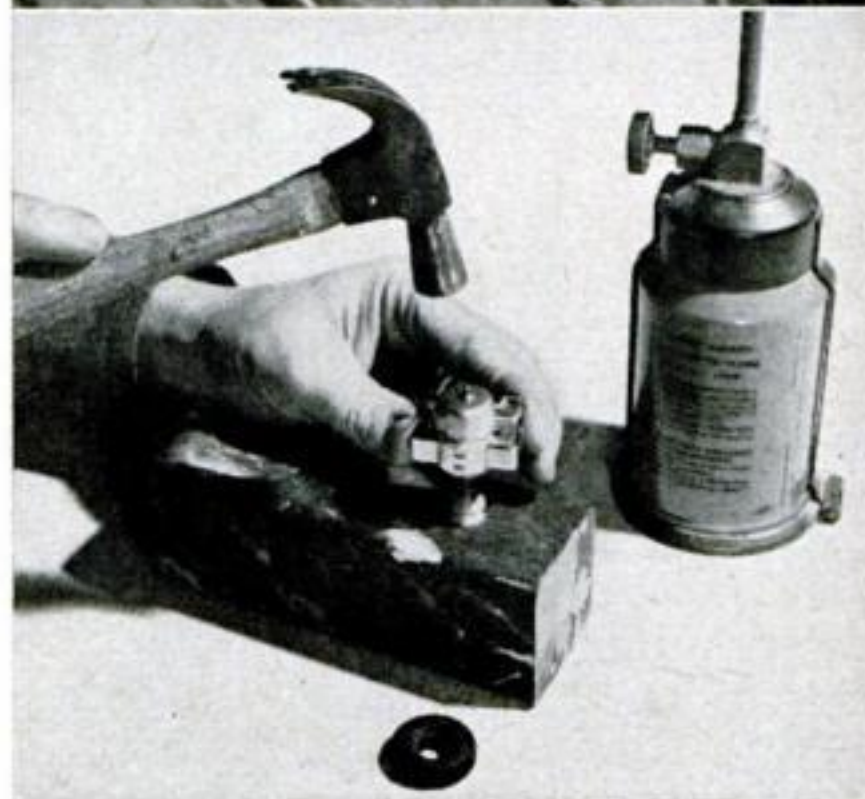
**E**VERYBODY on wheels wants to know how fast he's going, so it's only natural for Junior to want a speedometer on his bike. He'll be fascinated (and you may be, too) by this all-electric one, which uses no batteries. Once the parts are on hand, you can install it on a week-end morning.

**Juice output indicates r.p.m.'s.** A speedometer counts wheel revolutions against time. An electric generator produces a voltage proportional to its speed, so its juice output is a direct measure of its r.p.m.'s. To put this fact to work for Junior, you mount a small DC motor so that one wheel of the bike will spin it.

Turned by the wheel, the motor becomes a generator. Hook up a cheap milliammeter to measure its output, and you can read the dial in miles per hour.

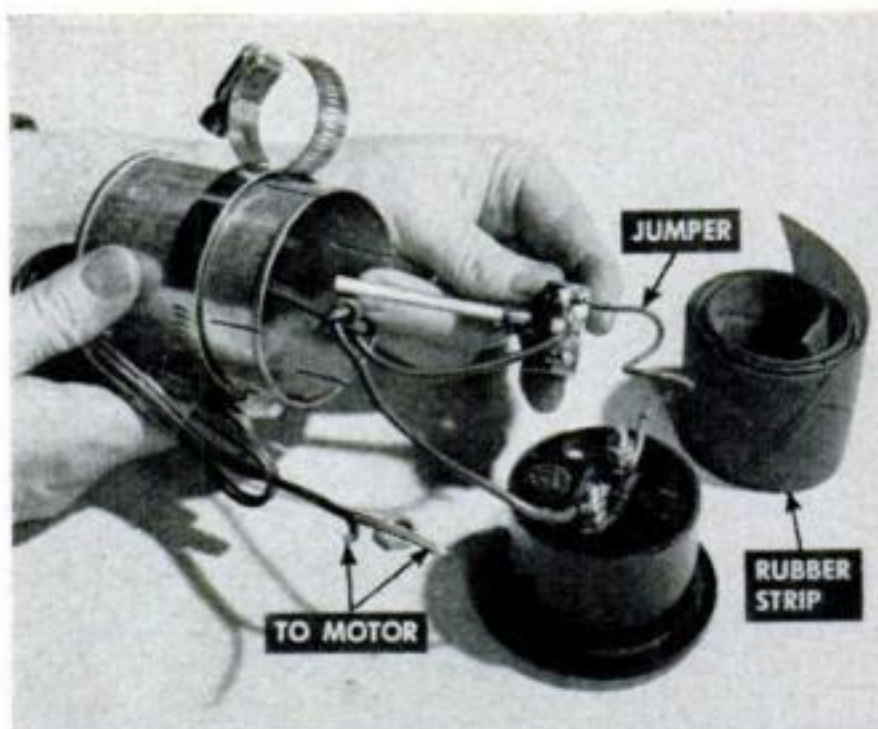
**Pick a durable motor.** Small battery motors with permanent-magnet fields are widely sold for use in model electric cars and boats, and for radio control. Since the motor will turn whenever the bike is in motion, choose one with husky bronze bearings and substantial brushes.

The one shown, costing only a dollar, delivers 300 milliamperes on a fast finger spin. Almost any meter reading from 1 ma. to 300 ma. full scale could therefore be used. One with a 5-ma. movement and a dial reading 0-30 volts is ideal, for



**REMOVE THE TIRE** and heat the hub gently with a torch or on the kitchen stove (be careful not to melt it). Place it over a hole in a block. Then carefully tap the motor shaft through it.

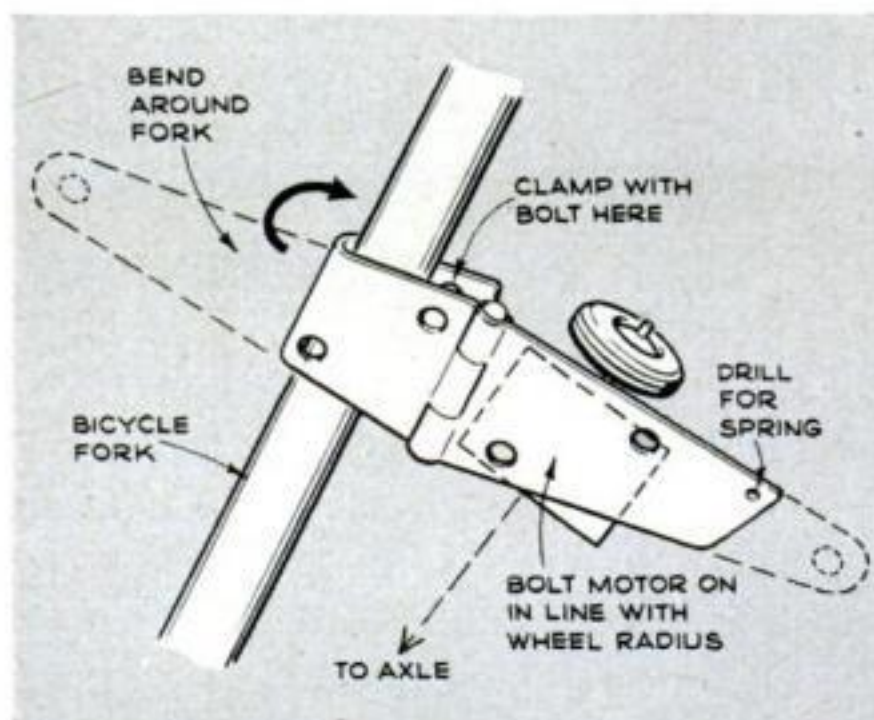




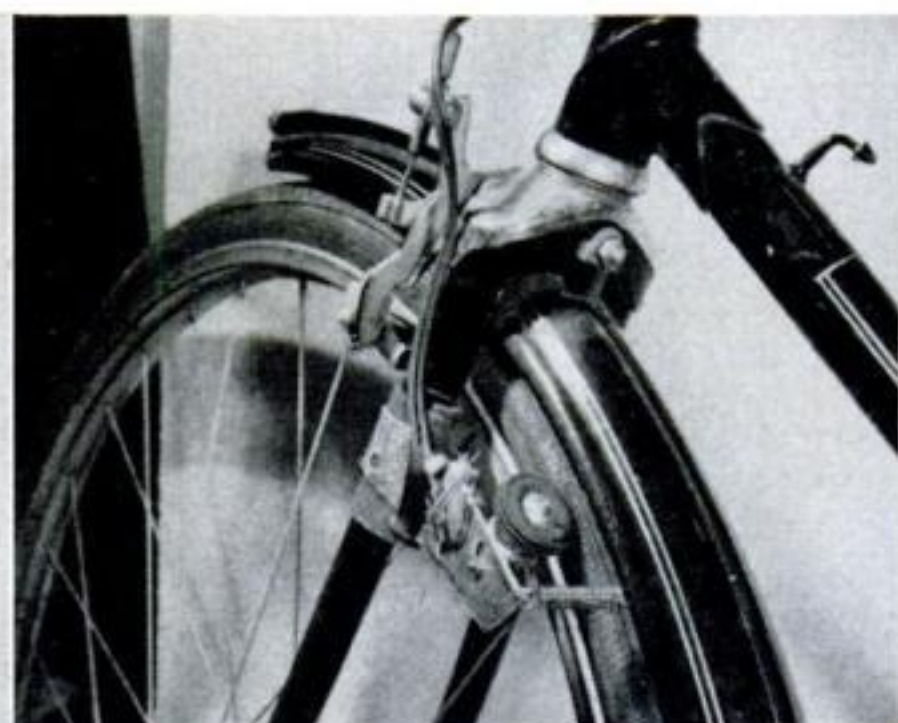
**HACKSAW FOUR SLITS** in the can edges. Drill two  $\frac{3}{8}$ " holes in the bottom for potentiometer and a rubber grommet. Run rubber-covered lamp cord through grommet, one wire to meter, the other to the center potentiometer terminal. Solder a short wire jumper from either outside potentiometer terminal to second meter post.



**TO MOUNT THE METER**, cut a strip from an old inner tube. Wrap enough around the meter case to make it a snug fit in the can. Tighten the big clamp around the can slits, locking the meter in. Loop the small clamp through the big one and tighten it on the handle bars. Seal dial glass with shellac around the edge.



**BEND ONE LEAF** of the hinge to fit around the fork (rubber between protects the finish) and secure it with a bolt and nut. Bolt the motor to the other hinge leaf, with its shaft in direct line with the axle of the bicycle wheel.



**POSITION MOTOR WHEEL** to run on side of tire or, if bike has wide rim for hand brakes, on the rim. Hook a spring from fender to hinge leaf. If the meter does not indicate when wheel turns forward, reverse the motor leads.

the 30-volt scale can be read as m.p.h.

To reduce the current to what the meter can safely carry, and to calibrate the scale, use a potentiometer of suitable value. For a 5-ma. movement, 500 ohms is enough. With a 1-ma. meter, it should be 5,000 ohms. If you have a radio scrap box, try different values.

**Friction drives it.** You'll also need a 4" strap hinge, a large and a small hose clamp, a 1" to 1 $\frac{1}{4}$ "-diameter rubber-tired model-car or toy wheel, some wire and a tin can. Assemble these as shown in the photos. The meter should move when

the wheel is spun slowly forward. If it doesn't, transpose the motor wires.

The easiest way to calibrate the meter is to ride the bike alongside another fitted with a good speedometer, or beside a car. At a steady speed, the bike rider can then adjust the potentiometer to bring the needle to the correct figure. Start with the potentiometer at maximum resistance; then back it off until the 15-m.p.h. reading comes about midway on the scale. Be careful not to turn the control too far with a sensitive meter.—*Forrest H. Frantz, State College, Miss.*



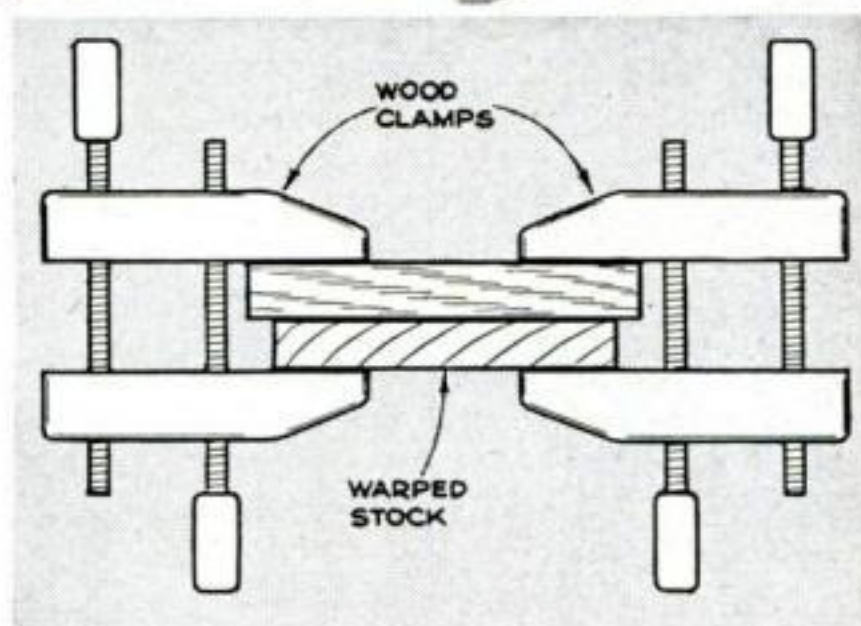
## Rubber Unkinks Leader

A SMALL square cut from inner-tube rubber will take the kinks from a fishing leader. Fold the square and hold it tight with one hand while you pull the leader through with the other.—*John Krill, North Lima, O.*



## Polish Bottle Does Out Cement

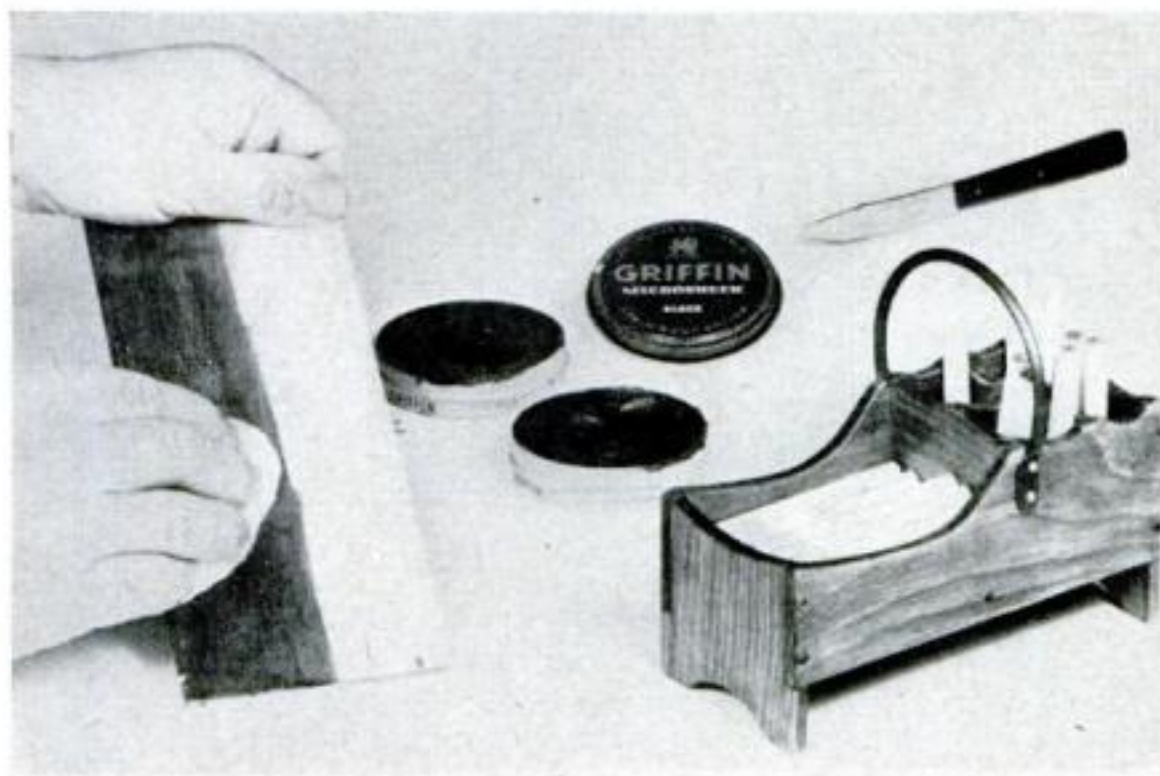
A NAIL-POLISH bottle that you might get your wife to contribute will help make your rubber cement last longer. Use it from the tiny bottle; then your supply in the larger container won't thicken by being exposed to air so often.



## "Unwarping" Fits Board to Dado

WHEN a warped shelf or other finished piece of wood won't go into a tight dado, clamp it against a straight-edged board to hold it flat while you slide it in.—*Robert Irving, Walpole, Mass.*

## Out Comes the Shoe-Shine Kit—for That Antique Finish



DISTINCTIVE color stains can be mixed from different colors of shoe polish. Black and brown, for example, gives the antique finish shown at left. You can use shoe polish to finish picture frames, unpainted furniture, lamp bases and other articles. Colors such as tan, cordovan, mahogany, red and oxblood are available for blending. Apply the polish with a cloth and rub in.



# New for Your Car

## 1. Safety Belt Holds Baby.

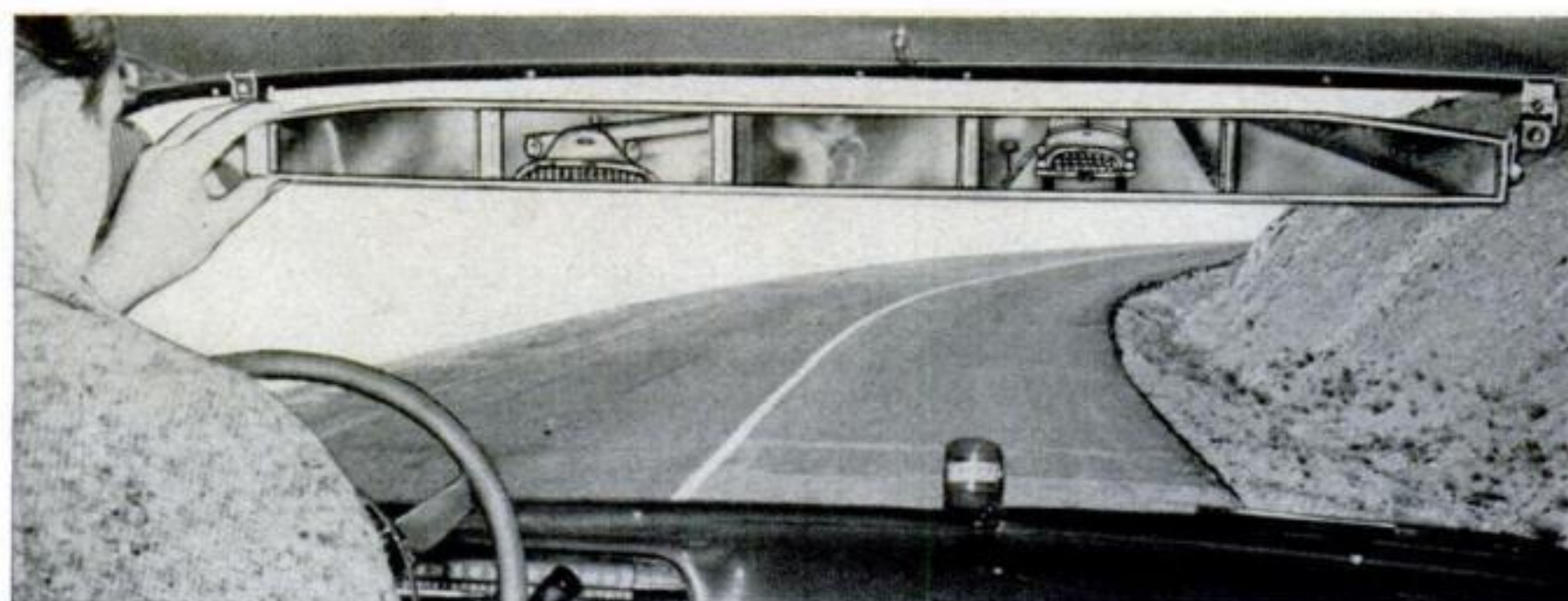
This belt permits a child to sit or stand in safety, while you keep your eyes on the road. Loops at the back slide on the vertical straps which can be fastened to the seat without tools. The belt has a quick-release safety buckle.



**2. Tool Cleans Windows.** One side of this cleaner has a thick wool-felt strip for washing car windows; the other has a squeegee to wipe them dry. You can also use the device while driving to clear mist from the windshield.

## 3. Pump Spots Cooling-System Leaks.

You can find a leak in a pressure cooling system quickly by using this air pump with a built-in gauge. Plug it into the radiator and pump to the pressure that is specified for your car's system. Water will bubble out through leaks in hose, connection or seam. The pump will also test radiator pressure caps.



**4. Mirror Gives All-Around View.** A new five-section rear-view mirror, 36" long, lets you see behind you and on both

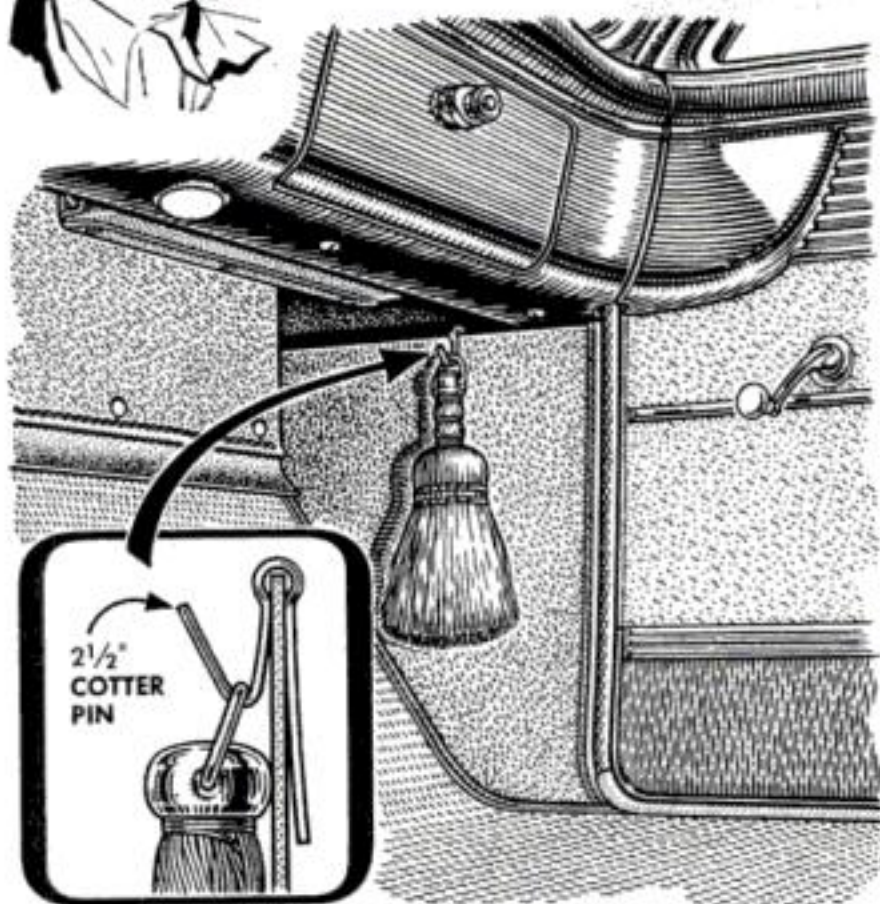
sides of the car. Its five mirrors are at preset angles in a steel frame that clamps to the rim of the windshield.

More information about these new car products can be obtained from: 1. Bye-Bye Belt, Box 789, Phoenix, Ariz.; 2. Safeway Specialty Corp., 114 Spring St., New York City 12; 3. Radiator Specialty Co., 1700 Dowd Rd., Charlotte, N.C.; 4. J. H. Schroeder Products, 401 LaPorte Ave., Northlake 3, Ill.





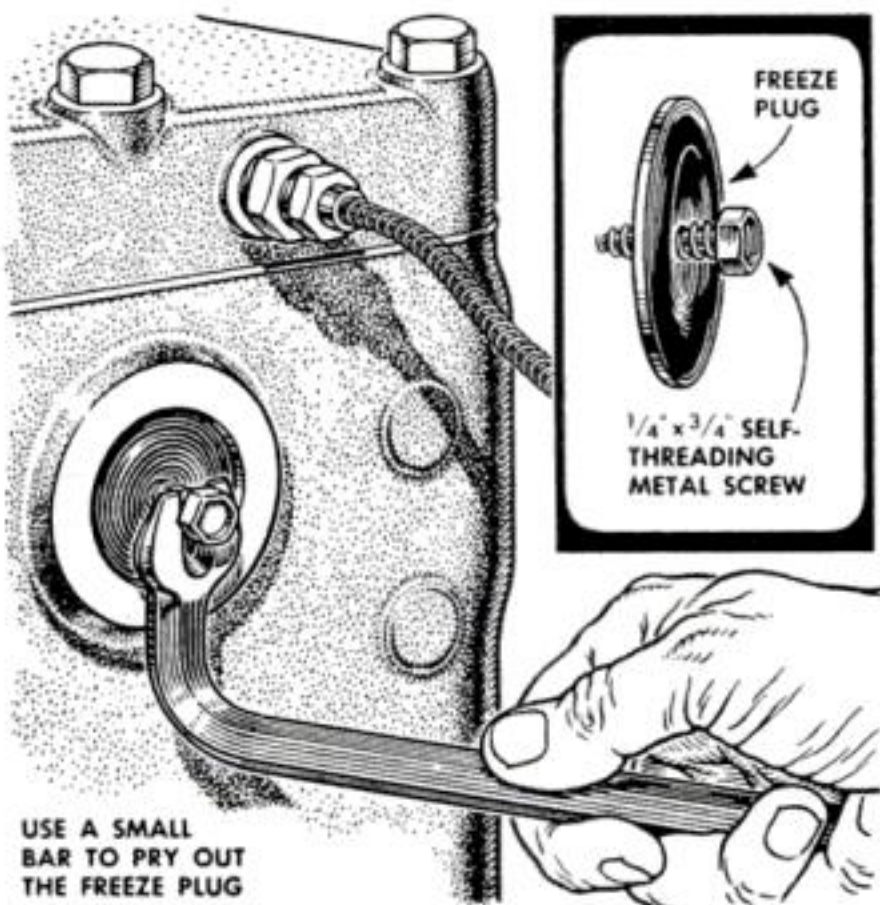
# Hints from the Model Garage



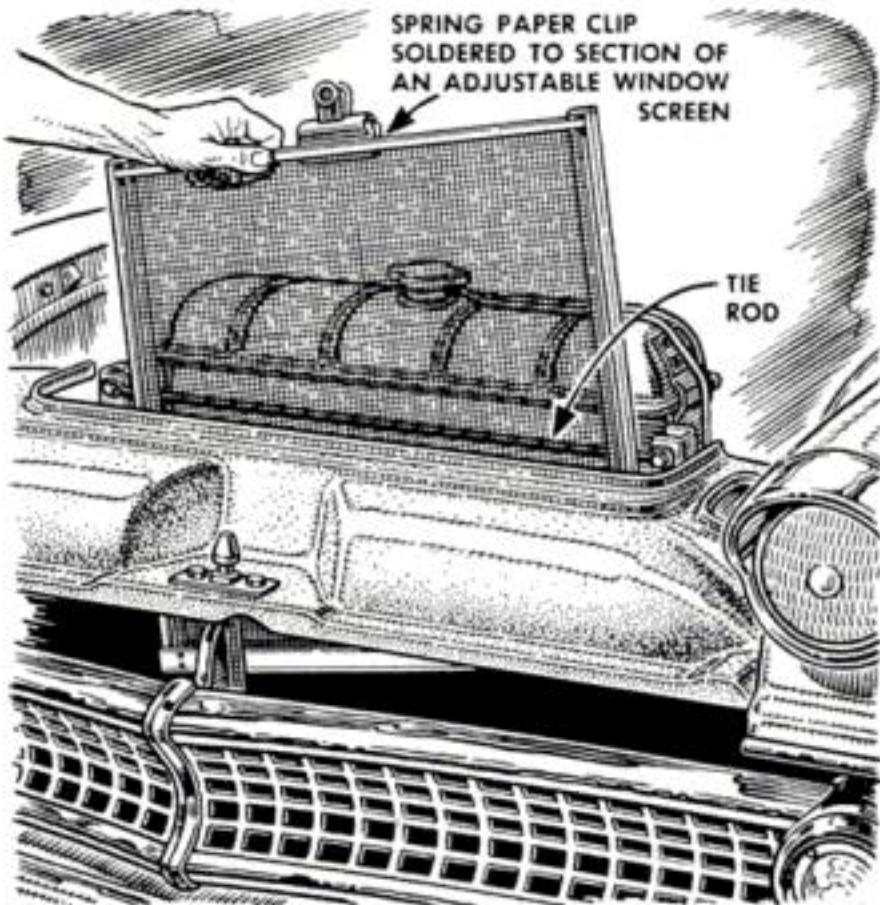
**A cotter-pin hook** like this will keep a whisk broom handy for sweeping out the car. Bend up one arm of the pin as shown. Then slip it over the side panel or through a hole punched in the panel.



**An unfolded map** pinned neatly to the head-lining above the front seat is easily referred to during a trip. The driver should consult it of course only after stopping, for instance, at a stop light.



**If a freeze plug leaks**, tapping with a hammer will usually seal it. When this doesn't work, one mechanic drills a small hole in the center of the plug, turns in a metal screw about four turns, pries out the plug and drives in a new one.



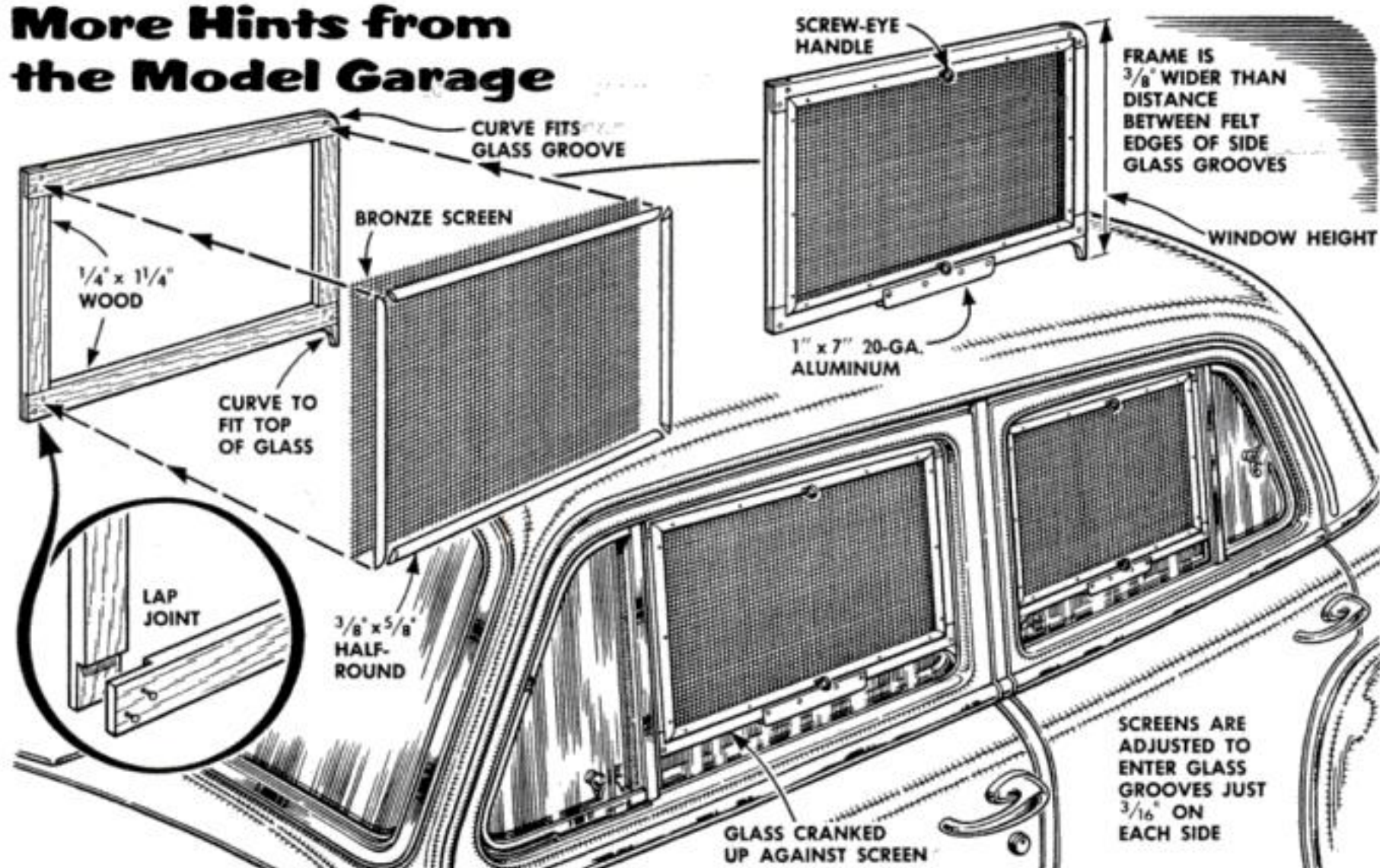
**During the bug season** one motorist keeps insects from plugging his radiator by slipping a section of an adjustable window screen into the opening behind the grille. A clip soldered to the screen rim holds it to the radiator tie rod.

**Please turn the page for more auto hints**

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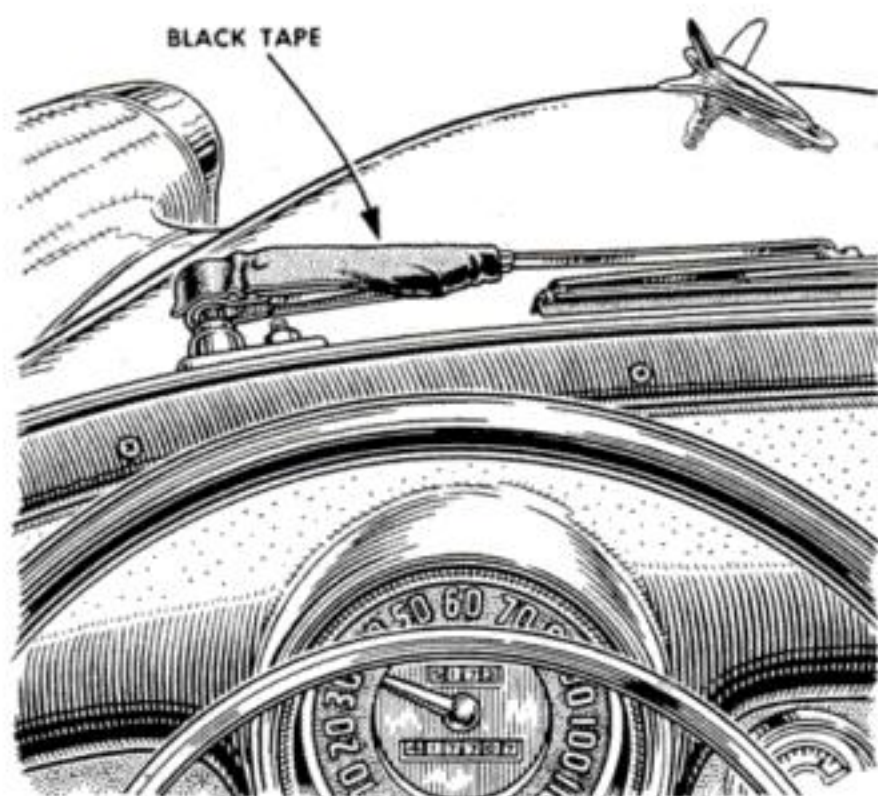
## More Hints from the Model Garage



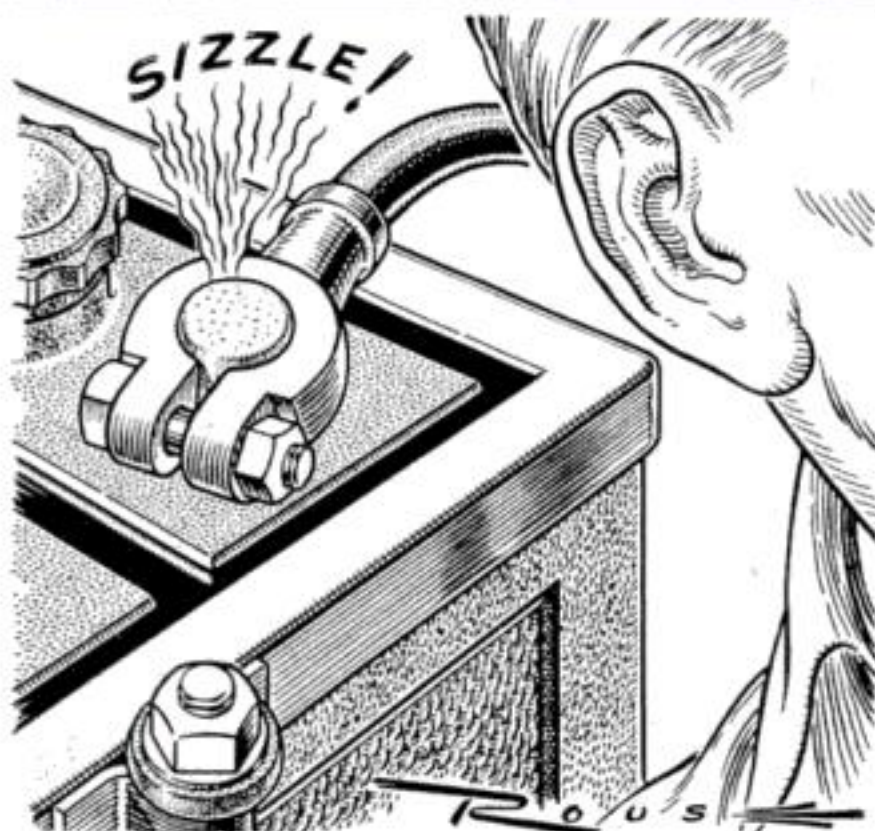
**A set of screens for your car** will help you keep cool at drive-in movies on summer evenings despite mosquitoes.

The screens above are designed to fit modern cars that have windows with side channels  $\frac{1}{4}$ " wide and  $\frac{3}{8}$ " deep. The frame should be  $\frac{3}{8}$ " wider than the distance between the felt edges of the side chan-

nels. To install, a screen is shoved to full  $\frac{3}{8}$ " depth in one side channel, allowing the opposite edge to enter and be pushed back  $\frac{3}{16}$ ". The window is then cranked up between the aluminum strips against the screen, shoving the upper edge into the top channel. Yardsticks are ready-sized wood for the frames.

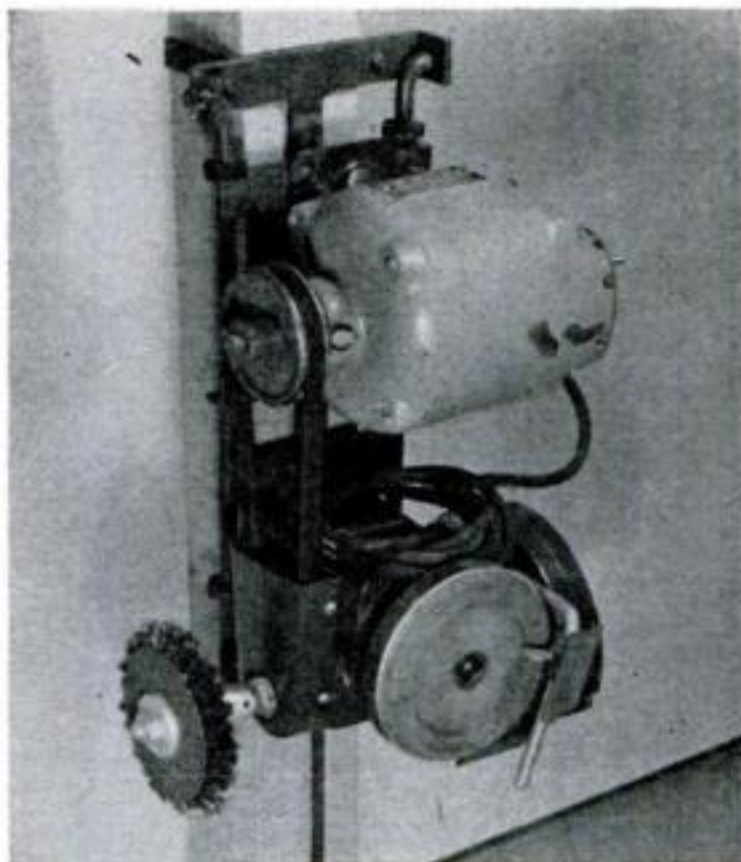


**Sunlight reflecting** off the shiny chrome covers of windshield wiper arms can be quite annoying while you are driving during the summer months. Eliminate the glare by sticking a piece of black tape to the upper surface of each arm cover.

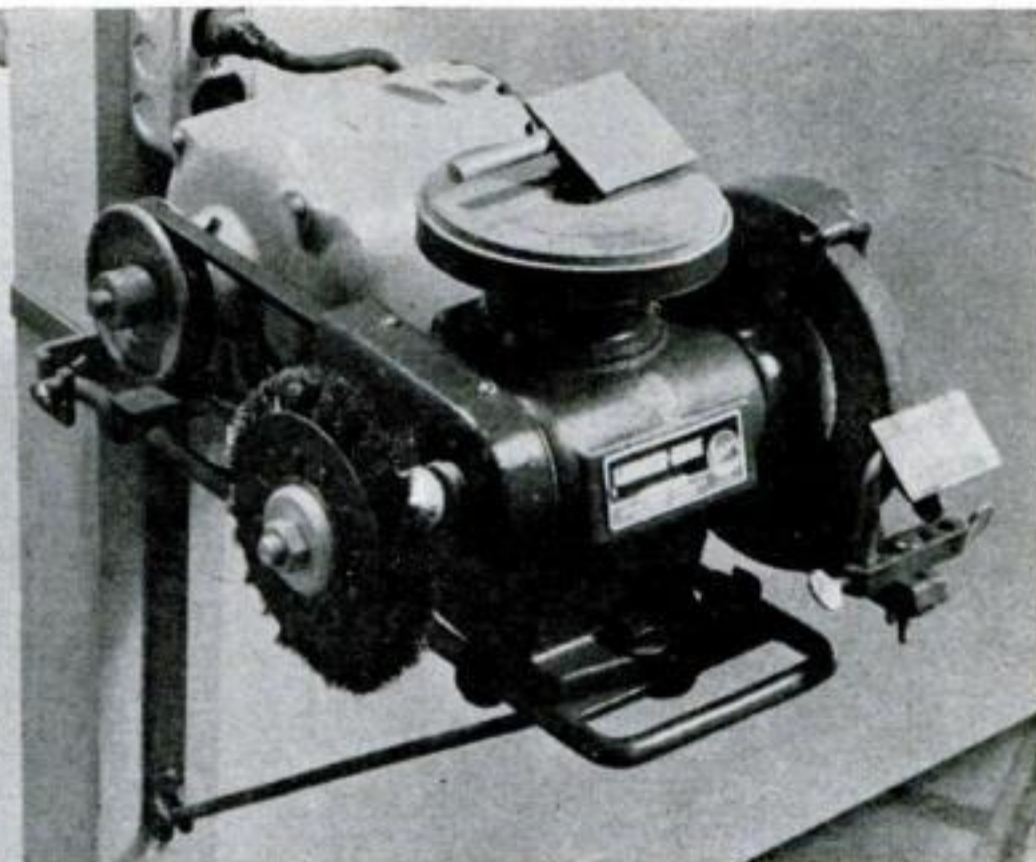


**A frying noise** from this battery terminal was the only response when the starter switch was depressed. The cable seemed tight. But the mechanic found it was making only slight contact with the post. Cleaning completed the circuit.





**HINGED ON A POST**, this grinder-hone unit is always available yet out of the way. When



swung up for use, it is braced with a rod that pivots at the bottom of the mounting bracket.

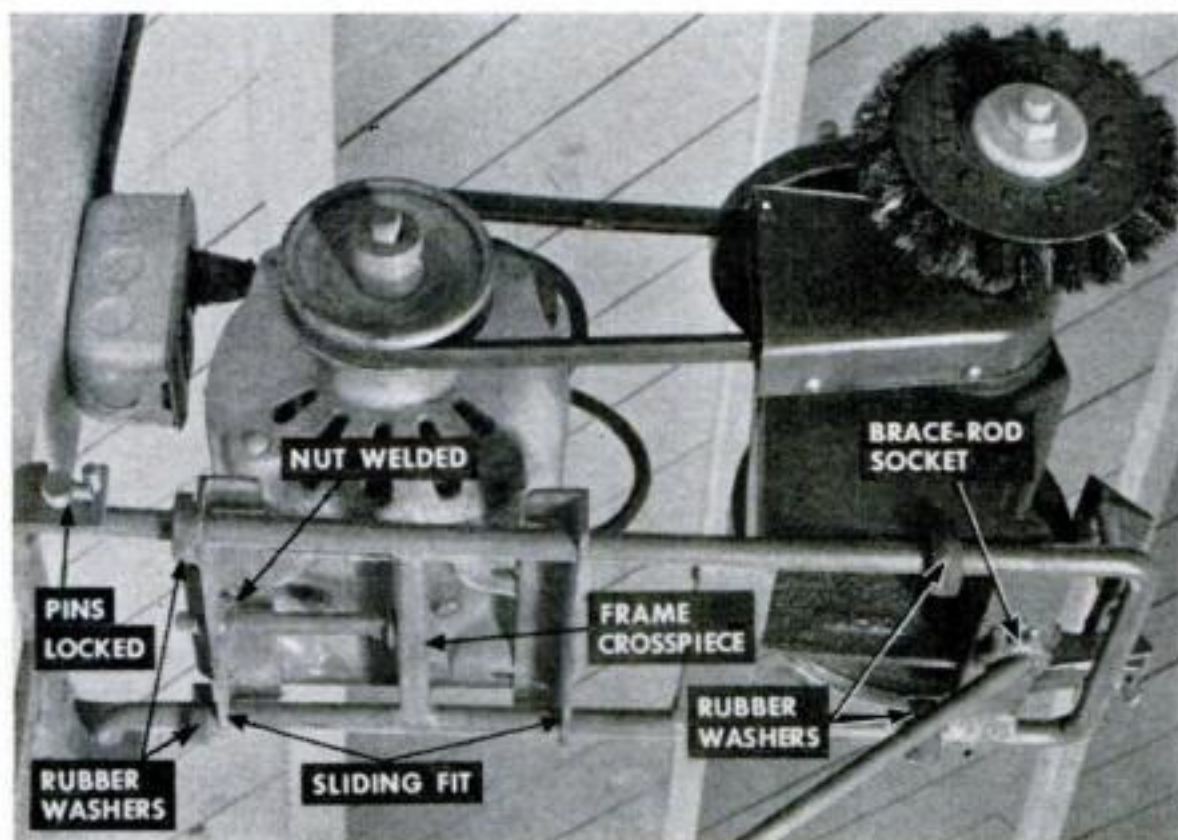
## Swing-Up Grinder Saves Shop Space

**W**HEN not in use, my hone and grinder head hangs in front of a post in my shop, taking up no floor or bench space at all. It can be raised into working position in a jiffy. But best of all, I can lift it off and take it anywhere.

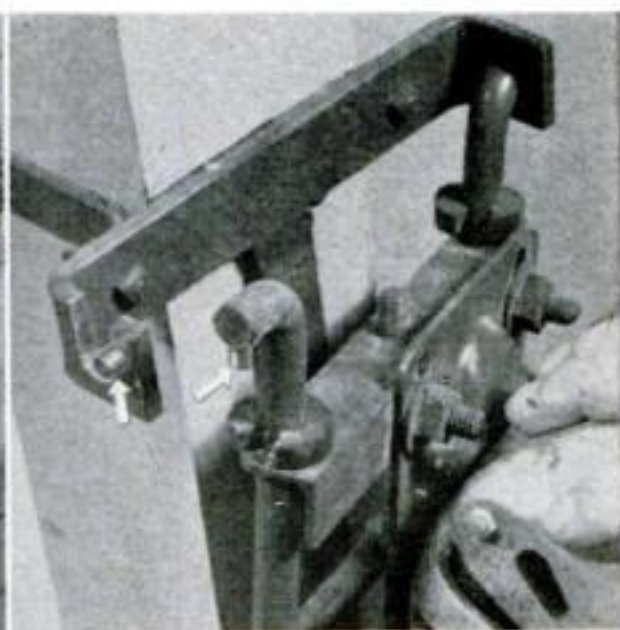
Such a rig could be hung on a wall instead of a post. To make it, bend  $\frac{1}{2}$ " rod into a deep U (the middle becomes the handle). Bend both ends  $90^\circ$  to engage a hole and a notch in the mount-

ing bracket. Weld flat pieces across to support the grinder, and a ring under the front one for a brace-rod socket.

Drill two pieces of angle iron to slide on the frame. Drill the other flange of each for the motor bolts. The wall or post bracket is T-shaped, made by welding a shallow U-shaped piece to a long strap. Roll up the lower end of the strap, or weld on a smaller U, to hinge the brace.—*Bob Gilmore, Sonoma, Calif.*



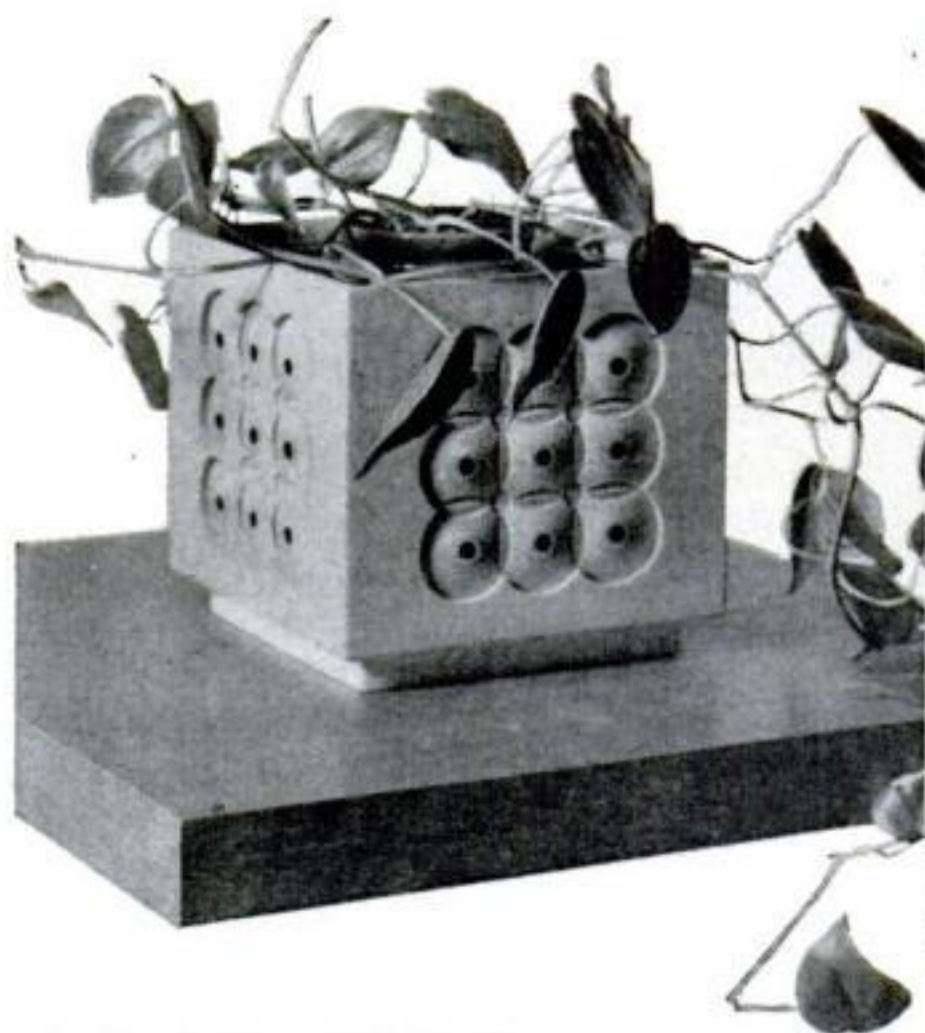
**SEEN FROM BENEATH**, the frame has three welded crosspieces, two of them the grinder mounts. A carriage bolt screws into a nut welded on one motor support. Bearing on the third crosspiece, the bolt pushes the motor back to tighten the belt. Thick rubber washers serve as feet when the unit is detached.



**FOR ON-THE-JOB USE**, the unit is removed by lifting one side of the frame out of the open notch as above, and drawing the other out of its hole. Two pins welded to the frame and bracket (arrows) come into contact when the mount is swung up, locking this end securely in during operation.



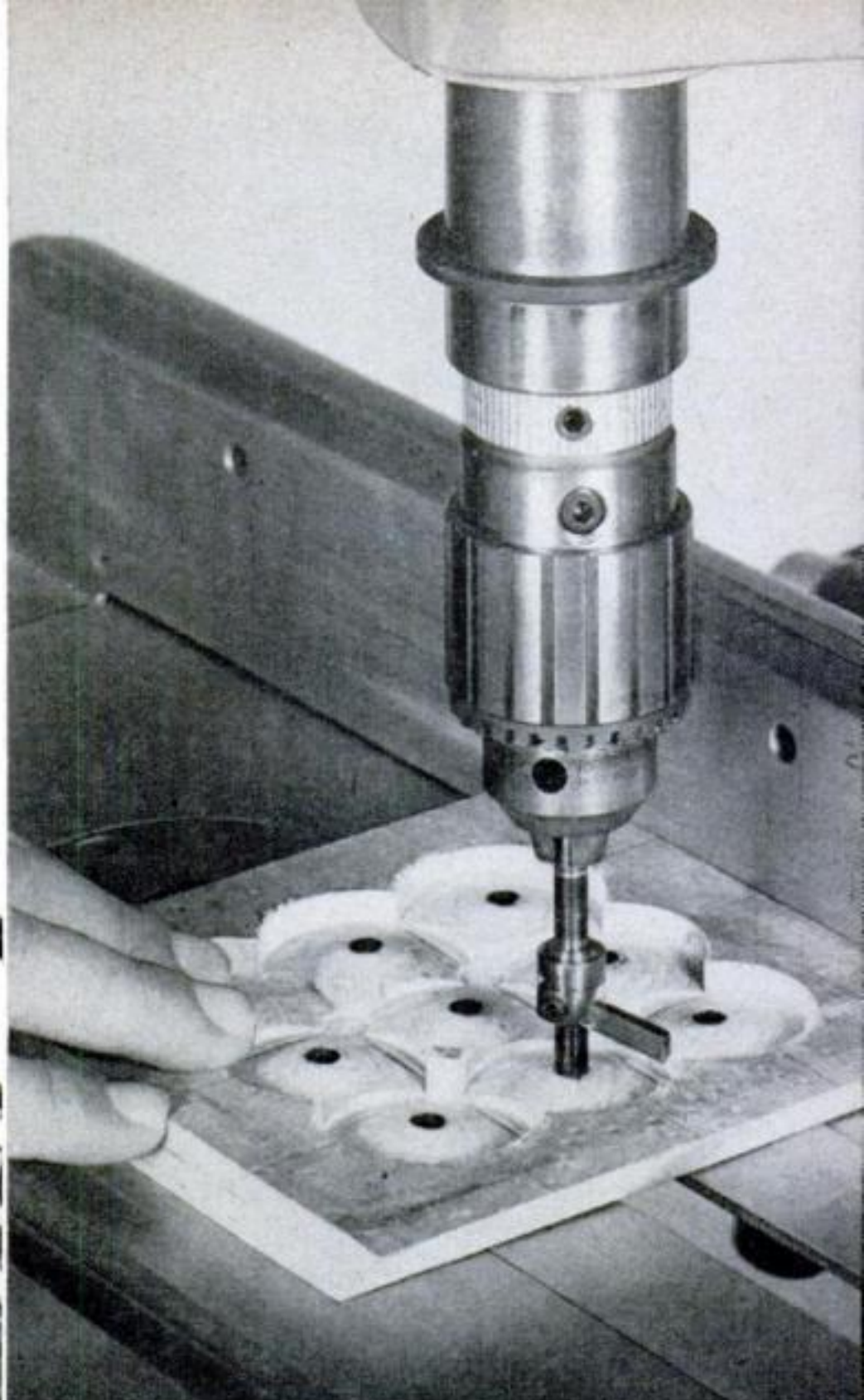
# Decorative Carving with a Fly Cutter



By R. J. De Cristoforo

**D**EEP, luxurious carving, as well as drawer and door pulls with a custom look, can be turned out with drill-press speed in your own shop. The samples shown are only a beginning; you can take off from there by adapting the technique to your own projects. Fancy moldings, unusual railing or framing, massive candleholders, ash trays and other accessories are all possible.

**Sloping bit does it.** A fly cutter in which the blade clamps at a shallow angle turns the trick. As the cutter is fed in, the pilot drill makes a center hole and



**HERE'S SOMETHING DIFFERENT** in machine carving. Overlapping recesses made with a fly cutter result in these handsome geometric designs. The bird's-eye maple planter at left is ornamented with shallow cuts of small diameter, the cutter's pilot holes being left open.

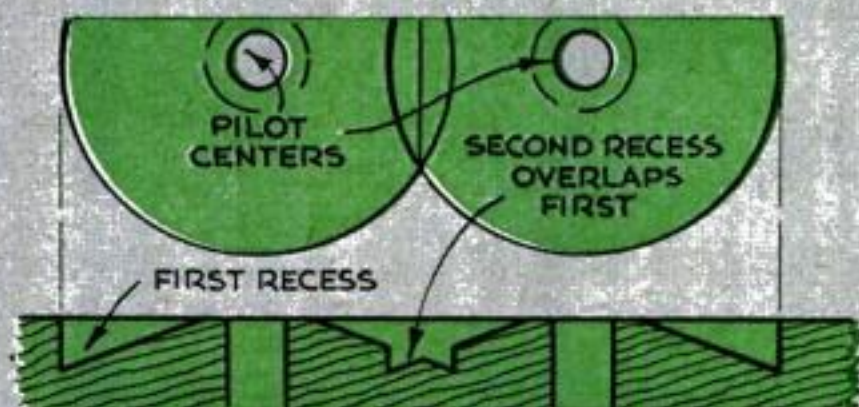
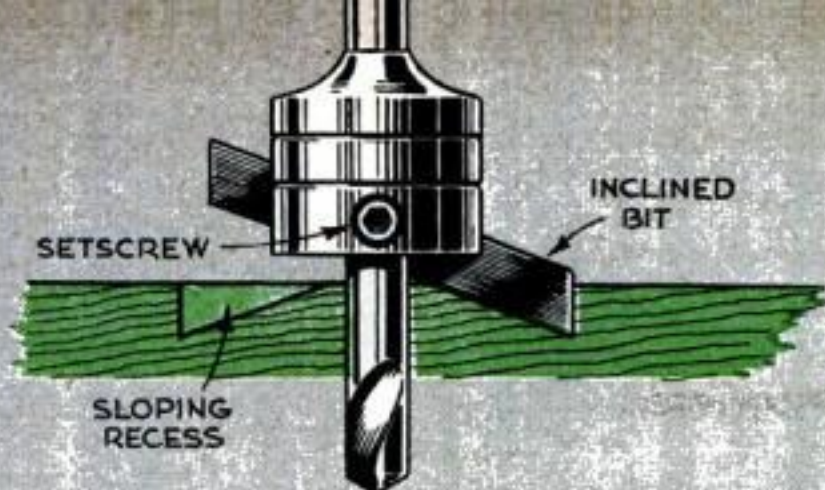
the blade a circular recess with a sloping bottom. If a second recess is made close enough to overlap the first, new angles and interesting arc patterns result. The commercial cutter shown\* is available in two sizes, and since the bit is adjustable, a wide range of designs is possible.

Rotary carving can be done on almost any wood, but hard stock such as maple and birch is best. Such dense woods "feather" less under the cutter and so are easier to finish.

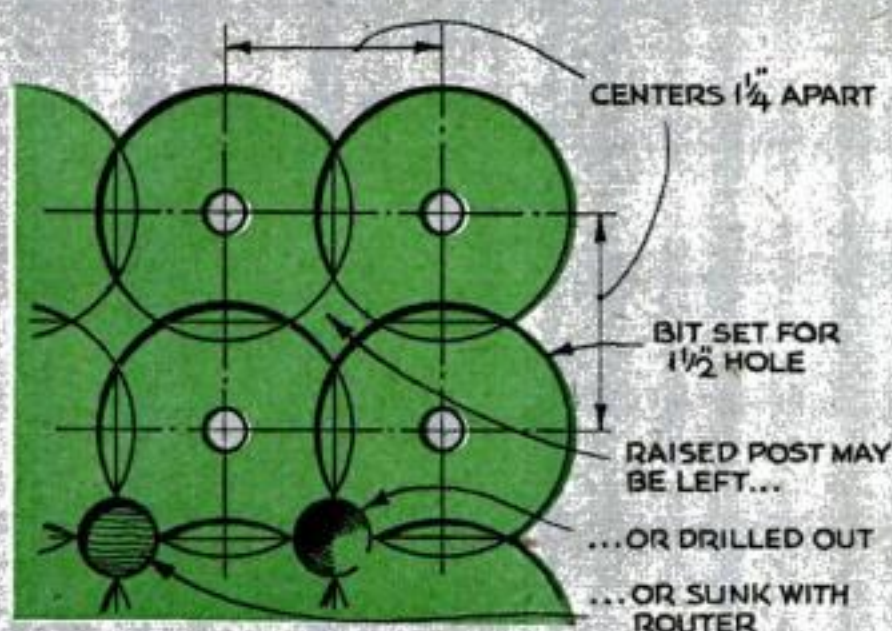
**Plan work in pencil.** One attractive panel design is shown. To plan your own, use ruler and compass; the photos will

\*Adjust-A-Drill, Jet Tool Co., Lemon Grove, Calif.





### HOW THE BIT WORKS



### PANEL PATTERN

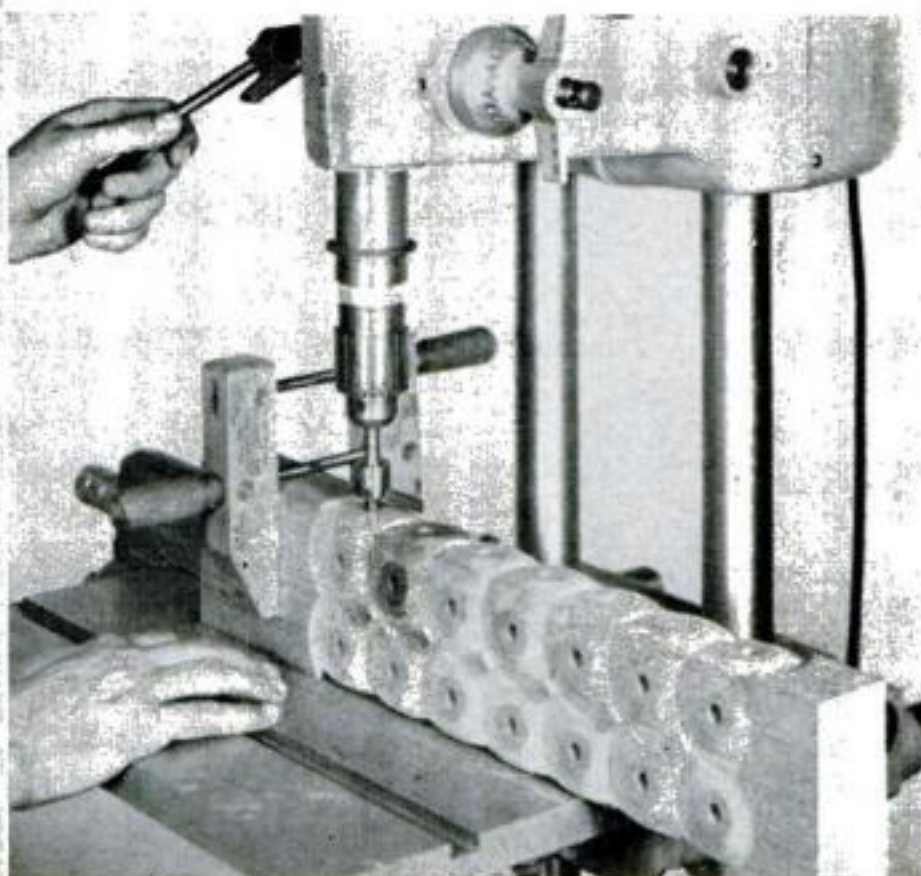
**RECESSES MAY INTERSECT** at one or several places, depending on their diameter and the degree of overlap. Test the pattern effect on pieces of scrap before starting a job. Drilling pilot holes before the actual carving is begun insures accurate starts and crisp work.

help you visualize the effects of overlapping cuts. Lay out the centers accurately on the work, punch-mark them, and drill all the pilot holes first, either with a drill the same size as that in the hole cutter, or by taking the bit out of the cutter and using its pilot drill alone.

**Tips on carving.** With the work clamped down and the spindle running at a low speed, carve the larger circles first. Use the quill stop to insure equal depth—variations will show up in the effect of overlaps. If the stock is so thick that the pilot drill does not break through the back, withdraw it occasionally to clear out chips. Instead of clamping the



**RAISED POSTS** remain between the circles. If shallow, they may be left as part of the design. Otherwise, remove them with a router bit, rotary file or drill. A fence can be used for small work as above, but be sure to keep your fingers well away from the cutting tool.

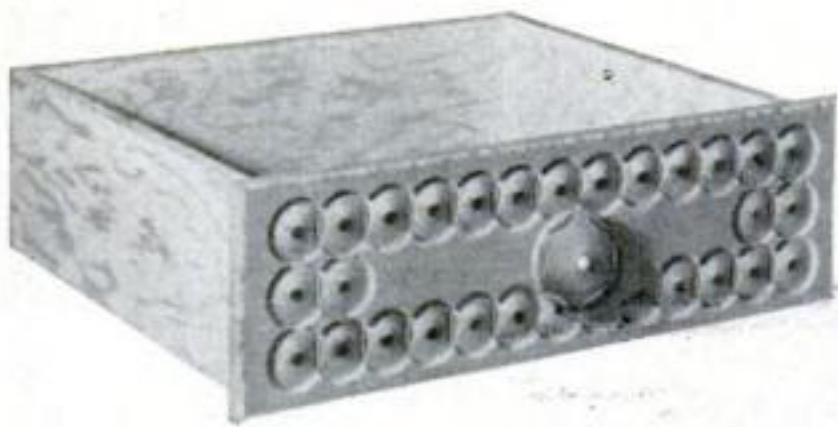


**UNIFORM CUTS** on four sides, as shown above, will make attractive lamp bases, room-divider railings, or posts. Set the quill stop to insure equal depth, and clamp the work against fence to maintain alignment, preferably at the right side of the cutter instead of the left.



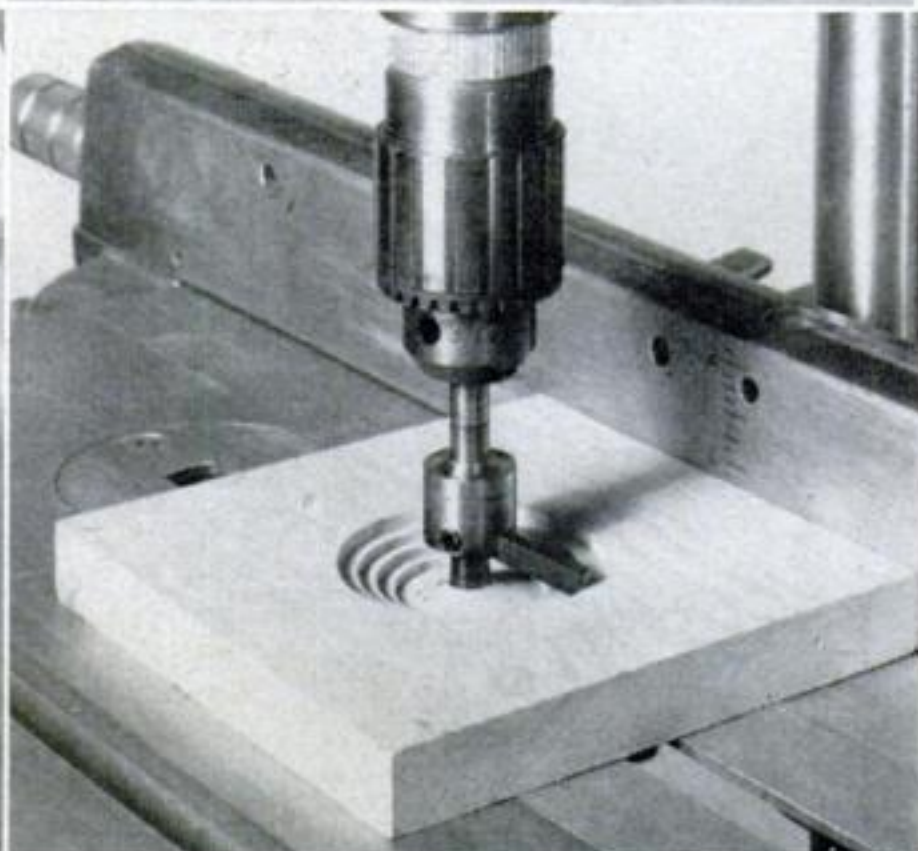
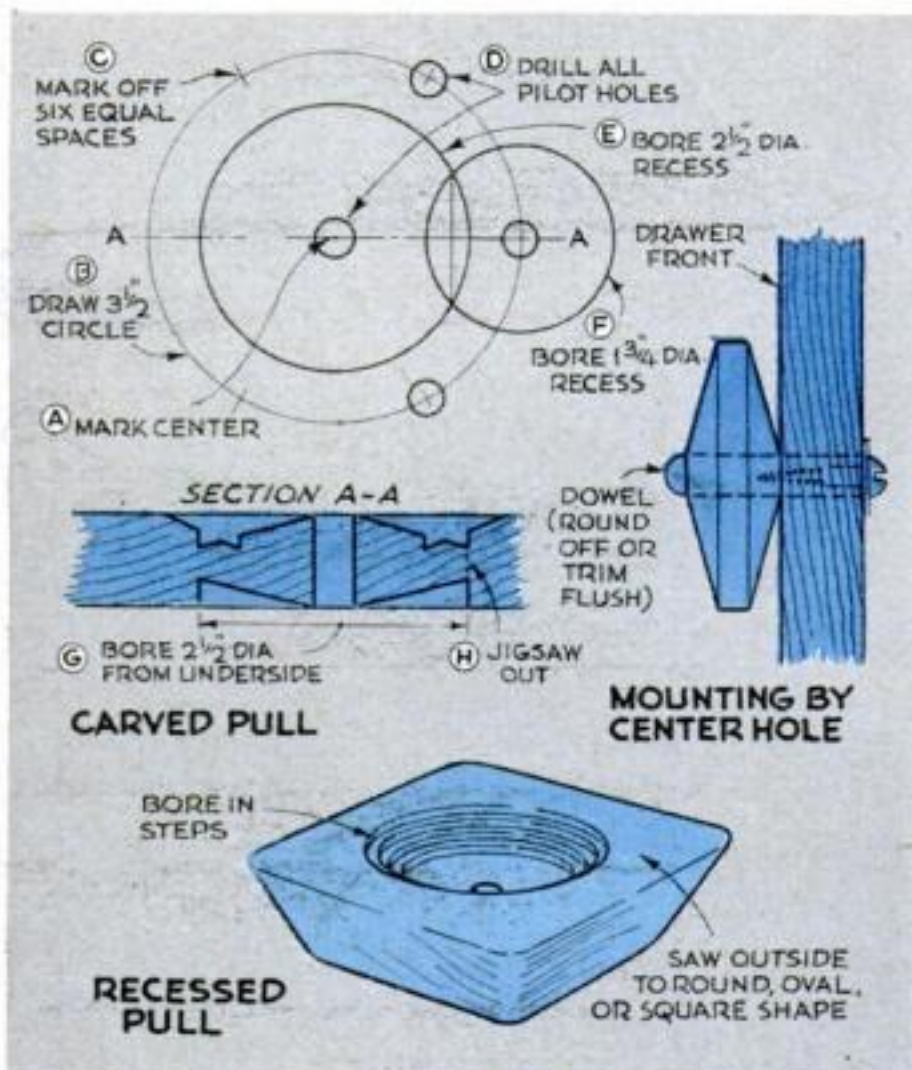
**NEW TWIST** on this technique is made possible by tilting the drill-press table as above. Lock the fence (or clamp a strip of wood) below the cutter and rest the work against it. Clamp the piece to the table, besides. Cut away waste wood outside the carved column afterward.





## Making Drawers and Pulls

**POINT OF INTEREST** in a chest or built-in might be one or more carved drawer fronts such as this. Recesses  $1\frac{1}{2}$ " in diameter, spaced  $1\frac{1}{4}$ " apart, give the effect shown. To make the drawer pull shown above, follow the numbered steps in the drawing. Jigsaw the piece free, mount it on a bolt, and spin it in a drill press or lathe as below to sand the outside true. For another modern pull, bore in successive steps as at right below. Saw out at a steep angle as in drawing.



work, you can hold it against a fence or a wood strip clamped to the table. Keep fingers well away from the bit.

Feed the cutter down very, very slowly; fast cutting will leave a rough surface. When the tool is at full depth, hold it a few turns. This has a burnishing effect that produces a good finish.

Slightly higher speeds may be used for cutting smaller diameters, or in softer woods. If the stock is thin, feed in cautiously so that the cutter does not jam into the surface at the moment the pilot drill breaks through.

If the cutter leaves a rough nap, try

dampening the wood after the initial carving cuts. Let it dry thoroughly, and then take a very light smoothing cut to remove the fuzz raised by the moisture.

**Finishing the job.** The pilot-drill holes can be left open for an airy or lacy appearance, or else plugged with dowels, disks or buttons. Such pieces may be of contrasting wood. Stains, paints or enamels can be used for finishing, but on most hardwoods a natural tone is most appropriate. It can be obtained by applying a coat of resin sealer followed with application of shellac, a clear lacquer or satin-finish varnish. **END**



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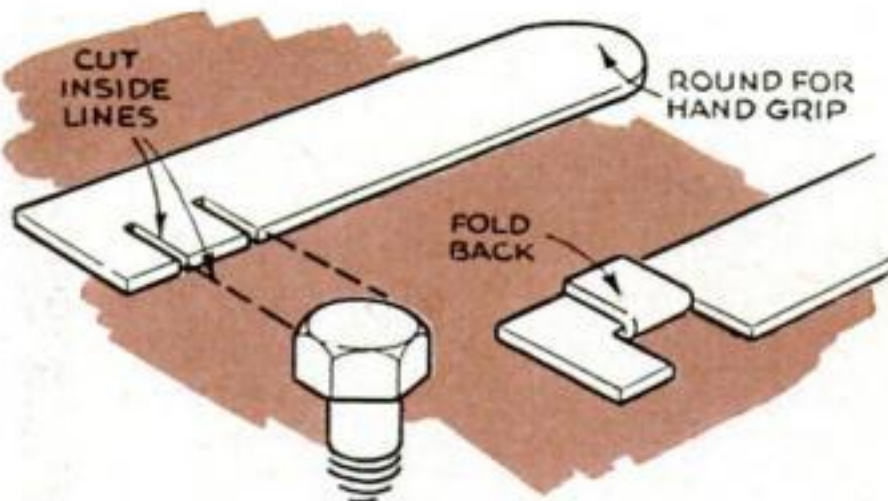
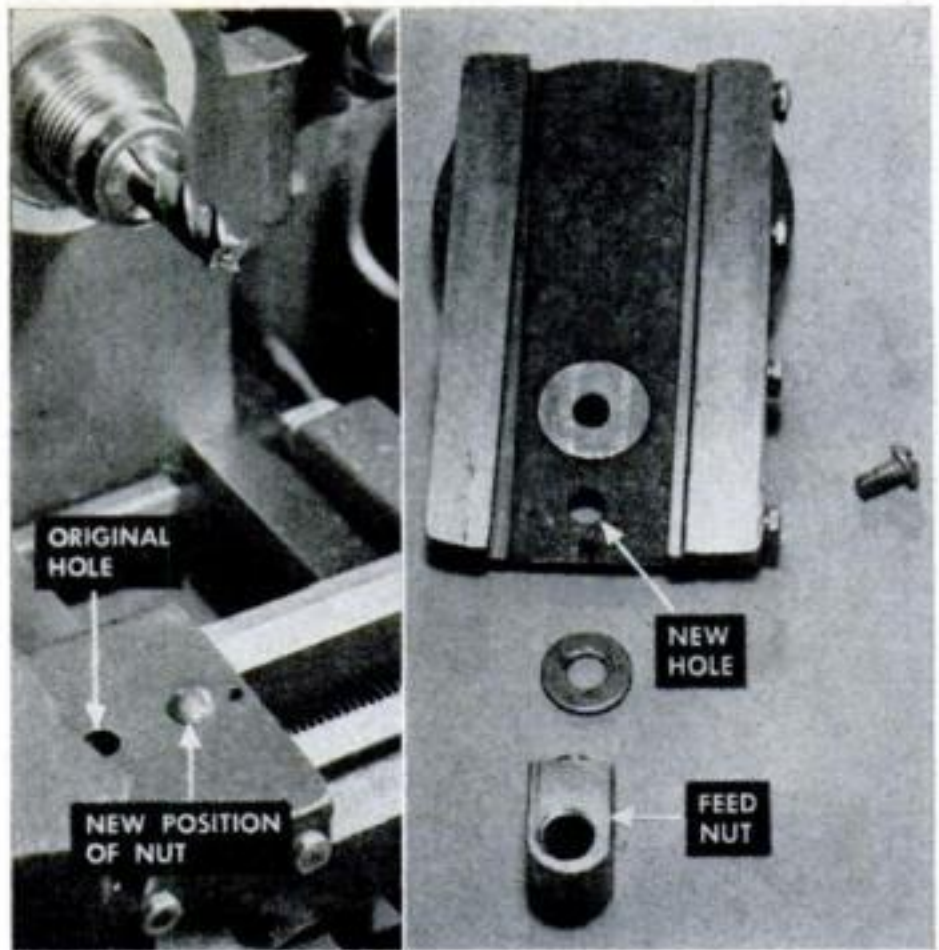
**Eastman Kodak Company**  
Rochester 4, N. Y.





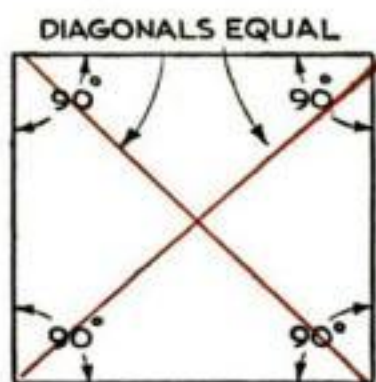
# New Shop Ideas

**Stretching Lathe Cross Feed.** For some milling jobs, it is helpful to extend the cross-feed movement backward, toward the operator. This can be done at the expense of an equal amount of infeed by relocating the cross-slide nut. Drill a new hole in line with the original one in the cross slide; but nearer the front edge, as shown at right. Use one or more washers to align nut with feed screw—*Carleton A. Phillips, Corning, N. Y.*



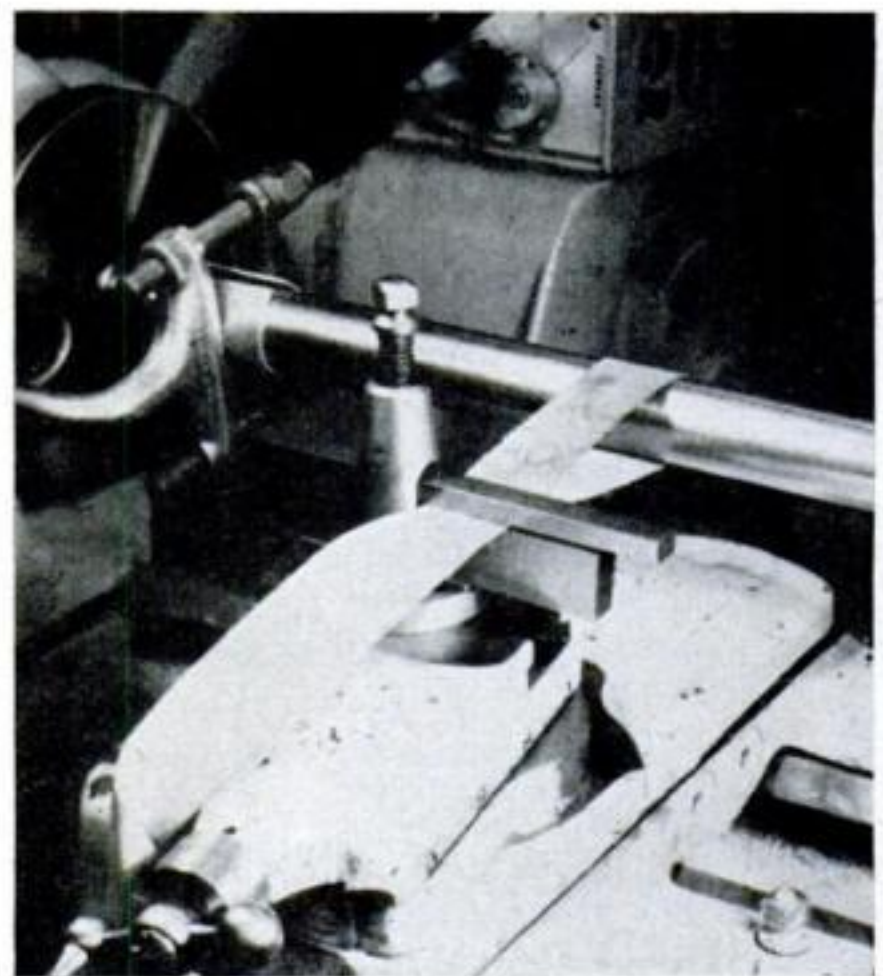
**Hacksaw Cuts Out Wrenches.** It takes only minutes to make wrenches to fit odd-sized nuts. In sheet steel of suitable width and thickness, make two hacksaw cuts the distance across the nut flats apart, and just a bit less deep. Fold back the piece between the cuts as above.—*T. F. Zimmerman, Beverly, N. J.*

**Micrometer Checks Squareness.** Work to be machined square can be checked with a micrometer more accurately than by sighting against a solid or combination square. Measure across both pairs of diagonally opposite corners. If the readings are the same, all four of the angles are 90°. If not, one or both of the diagonally opposite corners giving the greater dimensional reading are less than a right angle.—*George Schlenk, Drexel Hill, Pa.*



**Lathe Moves Polishing Strip.** A precision turning can be ruined by careless hand-polishing with abrasive cloth. The method shown below maintains the accuracy of the piece.

Loop a strip of abrasive cloth around the work, pinching the ends between parallels in the tool post. Put tension on the loop by retracting the cross feed. Using the highest spindle speed, make a few passes along the work with the carriage handwheel. Then engage the longitudinal power feed to move the strip, applying oil as polishing progresses.—*H. J. Gerber, Stillwater, Okla.*





MEN WITH MECHANICAL SKILLS:



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In discharging this trust, I pledge myself never to undertake work or approve work which I believe to be beyond the limits of my knowledge; nor shall I allow any superior to persuade me to approve aircraft or equipment as airworthy against my better judgment; nor shall I permit my judgment to be influenced by money or other personal gain; nor shall I pass as airworthy aircraft or equipment about which I am in doubt, either as a result of direct inspection or uncertainty regarding the ability of others who have worked on it to accomplish their work satisfactorily.

I realize the grave responsibility which is mine as a certified mechanic to exercise my judgment on the airworthiness of aircraft and equipment. I, therefore, pledge unyielding adherence to these precepts for the advancement of aviation and for the dignity of my vocation.

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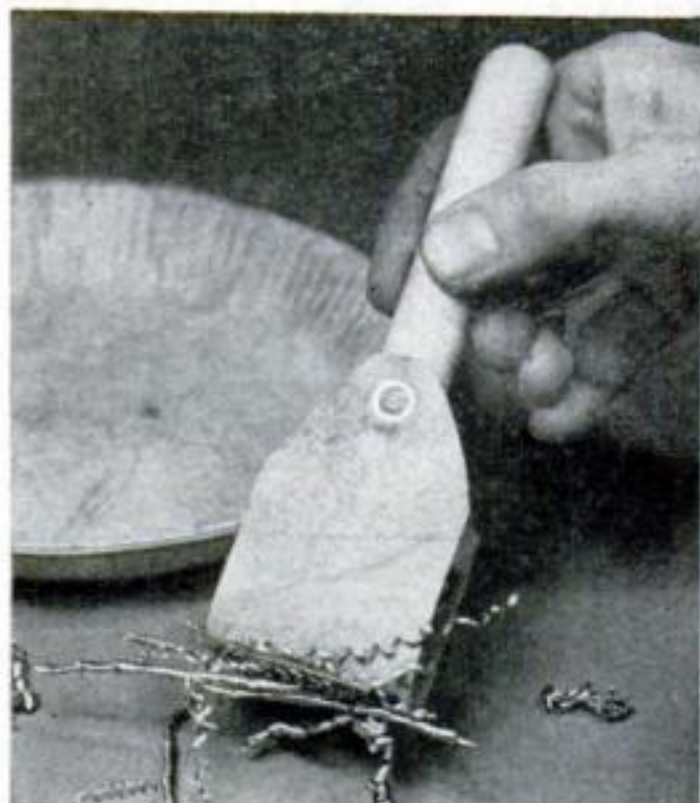
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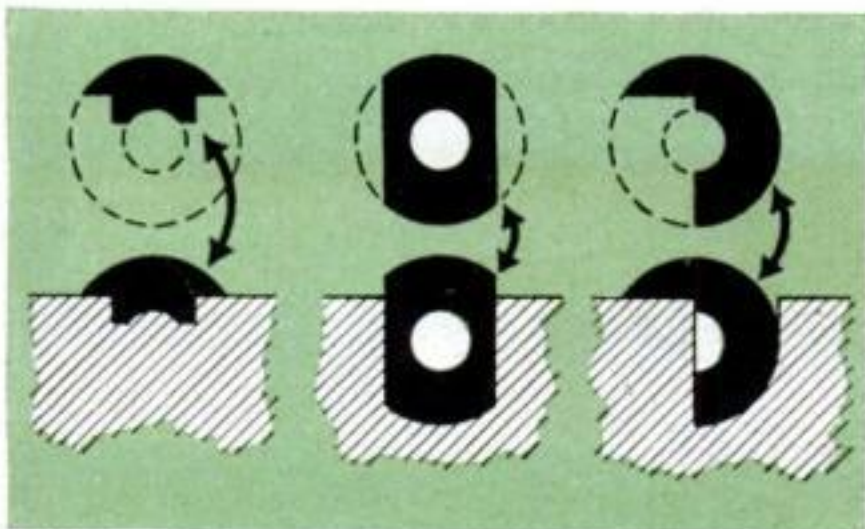
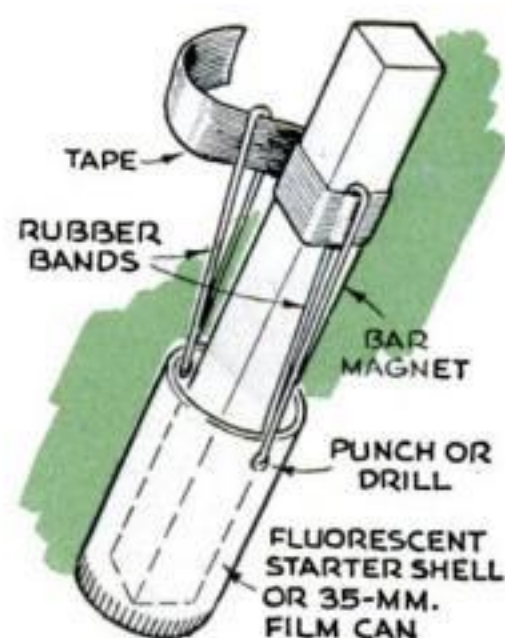


## More Shop Tips



**Pickup Magnet Dumps Its Load.** Once full, a magnet used to pick up chips and filings is very hard to clean. But the ones shown here are self-cleaning. The bar magnet at the right readily picks up right through the aluminum can. To release its load, you need only pull the can off a little way.

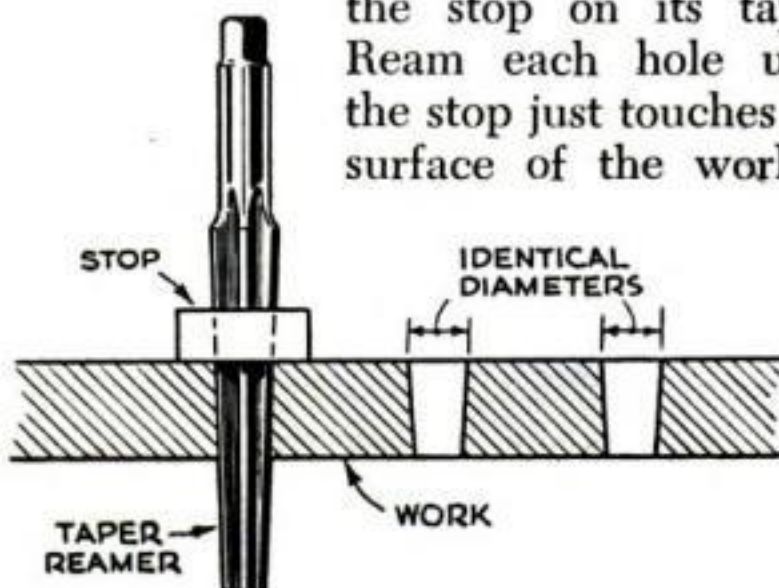
For a horseshoe magnet, fasten a crossbar to a handle and attach the magnet with a metal strap. Tack a strip of plastic fabric to the bar. Mount half a snap fastener on the fabric and the other half on a metal collar tacked to the handle, or cut a slit in the fabric to button over a roundhead screw. To dump, pull the cloth down as in the photo above.—*Walter E. Burton, Akron, Ohio.*



**Washer Measures Radius.** When a job calls for a radius so located that a standard radius gauge cannot be used to check it, a washer may serve the purpose. Either the inside or the outside radius can be used. Cut and file the washer as required to suit the work opening; the drawing above shows several applications. A handle could be soldered to the improvised gauge for easier maneuvering.—*Frank LaSaracina, New York City.*

**Stop Insures Uniform Reaming.** When several holes must be taper-reamed to the same diameter, a stop will save you the trouble of removing the reamer frequently to check each hole.

Make the stop out of a collar, or by drilling a hole in a short piece of round stock. Turn the reamer in it until the desired maximum diameter just passes through. Tap the reamer lightly to jam the stop on its taper. Ream each hole until the stop just touches the surface of the work.





By John Burroughs

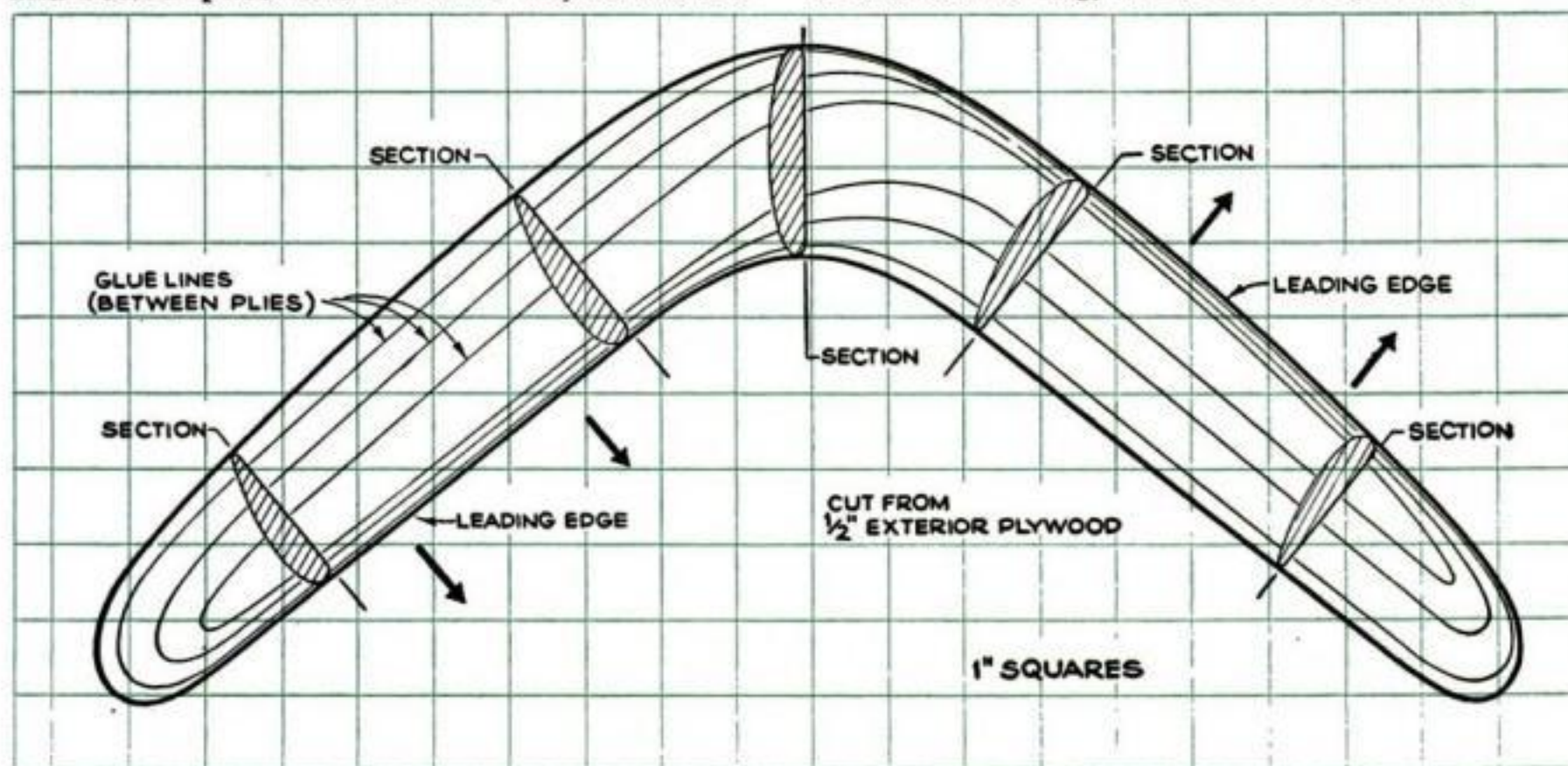


# How to Make a Boomerang

**A**N EXPERTLY thrown boomerang whips through some amazing aerobatics. Leaving the thrower's hand, it spins 150 yards in a straight line, parallel to the ground at eye level. Then it zooms upward to an altitude of more than 100 feet, curving around to the left at the same time. Finally the boom-

**LAY OUT BOOMERANG** so that the grain on top and bottom plies runs the same way as the hor-

izontal grid lines below. The under surface of the boomerang, not shown here, is flat.







### **How an Australian expert throws a boomerang**

**WINDING UP FOR A THROW**, Joe Timberley, descendant of an Australian aborigine chief, holds boomerang with curved side facing him. Note the three-finger grip at the very end of stick.

**STIFF-ARM, OVERHAND DELIVERY** is made with boomerang held vertically. Just as it leaves his hand, he gives it a flick of the wrist to impart spin. Aim is for ground 100 yards away.



**SPINNING VERTICALLY**, end over end, the boomerang gradually curves upward to the left and flattens out. It ends the flight, after several circles, in a horizontal glide back to the thrower.



**CLAPPING HANDS** over a spinning boomerang is the only safe way to catch one—if you must. Expert holds hands well out in front, a foot or so apart, clamps down hard at the right moment.

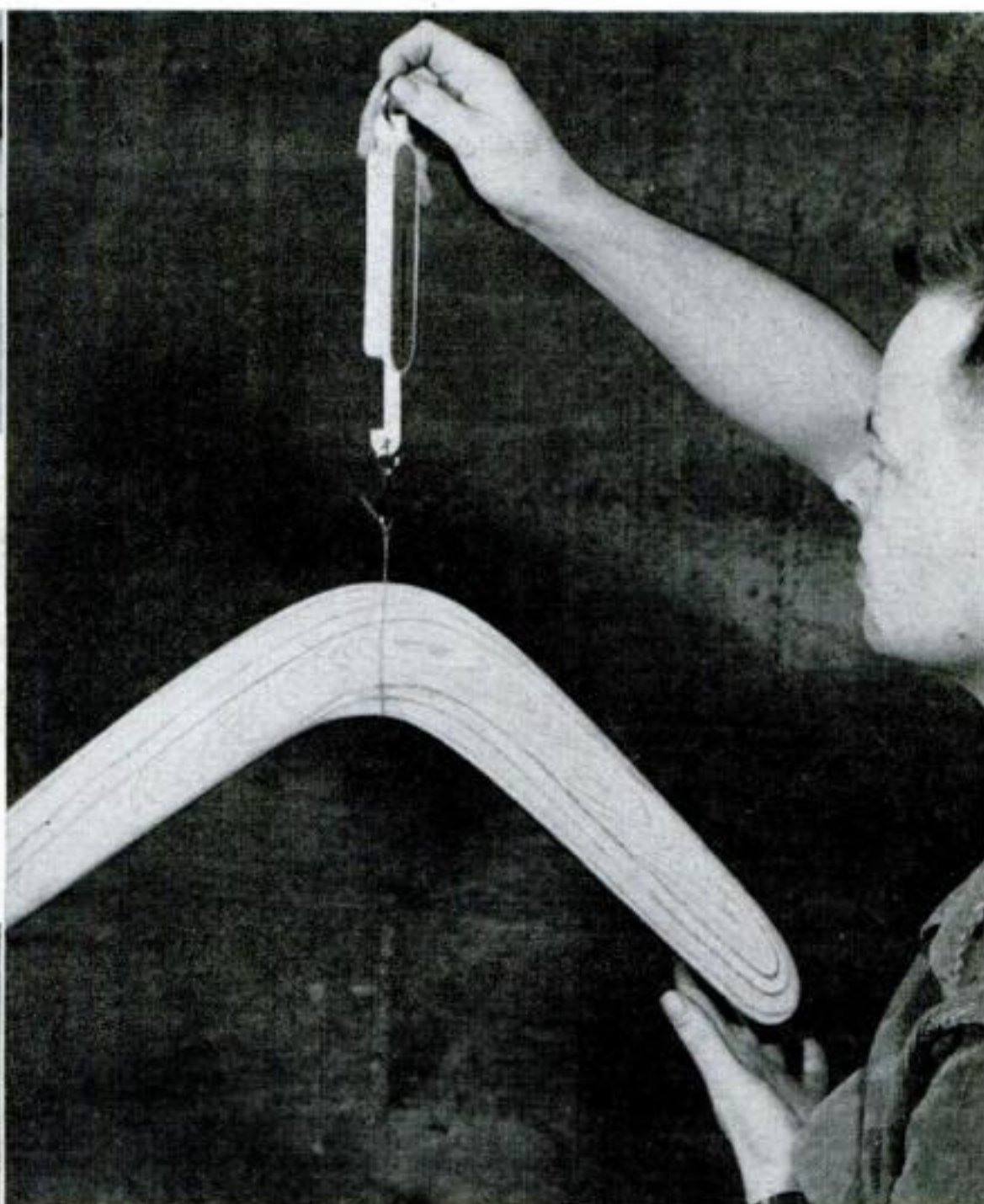


## Three major steps in making a boomerang



**AIRFOILS** on this right-handed boomerang are quickly shaped with a flexible sanding disk faced with rough sandpaper. If you're a lefty, switch the position of the leading edges.

**A SANDING BLOCK** for fine finishing prevents undercutting softer wood between hard lines of the grain. Smooth surface cuts skin friction, improves boomerang's performance.



**CHECK THE BALANCE** of your boomerang. If both arms don't weigh about the same, boomerang will wobble in flight. Sand a little more off the heavier arm to even things up.

erang spirals down to earth, making three or four wide circles before landing at the thrower's feet.

With practice you can do almost as well yourself. The Australian aborigines who throw them like that carve their boomerangs from bent acacia limbs. But a homemade plywood boomerang can have the same aerodynamic features.

King Tut of Egypt amused himself with boomerangs 3,300 years ago. Ancient Assyrians, North Africans, Indians from India and Hopi Indians from what is now Arizona all threw boomerangs. But most of them didn't come back.

**The "homing instinct."** Although the aboriginal Australians were more interested in the large and deadly non-returning boomerang—the word itself comes from a term meaning "war" and

"strike"—they were the first to build a reliable homing instinct into the missile, thus making aerodynamic history centuries before the Wright Brothers flew at Kitty Hawk.

A boomerang is very much like a pair of airplane wings joined at an angle of from  $70^\circ$  to  $120^\circ$ . The bottom surface of the boomerang is nearly flat. The other surface is rounded, with the thick edge of one wing meeting the thin edge of the other wing.

Engineers call this half-a-teardrop shape a cambered (curved) airfoil. They explain that an air stream slides over the curved surface quicker than it does over the flat one. Since pressure drops as velocity increases, the faster that air passes over an airfoil the greater the pressure difference between the two sur-





**DURABLE FINISH** of varnish or clear lacquer will protect the finished boomerang from chipping

and from the weather. Close the pores with resin sealer first; follow with two finish coats.

faces. This difference is translated into lift that keeps the airfoil up.

By making your boomerang of  $\frac{1}{2}$ " exterior plywood as I did, you won't have any trouble shaping airfoils. The glue lines between plies show up like the lines of elevation on a contour map. They help you judge the sharpness or flatness of a curve. In addition, fir plywood is inexpensive and easy to work.

The plan shown is for a light (six-ounce) boomerang with arms slightly more than  $90^\circ$  apart. It returns well, is easily thrown and simple to make. One thing more: it's right-handed and moves to the left. For a southpaw, put the leading edges where they appear when the drawing is held before a mirror, so it will circle right and come back to you.

**Shaping the airfoils.** Cut out the boomerang blanks with a jig or coping saw. Shape the curved surface of the airfoils with a disk sander, if you have one, or else use a half-round rasp. Give it a glass-smooth finish with the finest sandpaper you can find—to cut skin friction. And dull the edges to minimize chipping and injury to bystanders.

**Throwing technique.** Here are some tips from the Aussies on how to practice boomerang throwing. Start off by perfecting your spinning technique. Spin

puts the aerobatics in a boomerang's flight and makes it return. It's done by bending your wrist downward in a quick flick at the last moment.

Practice this flicking motion until you achieve good but short flights with little more than spin alone. Always aim as though to hit the ground about 50 yards away. Then gradually add more and more throw to your spin until you are giving it all of your strength.

Practice to develop a straight overhand delivery. When you throw with a sidearm flip, the boomerang sails high into the air, stalls and plummets to earth.

If you really get enthusiastic about boomerangs, and it's not hard, here are some modifications you can try later.

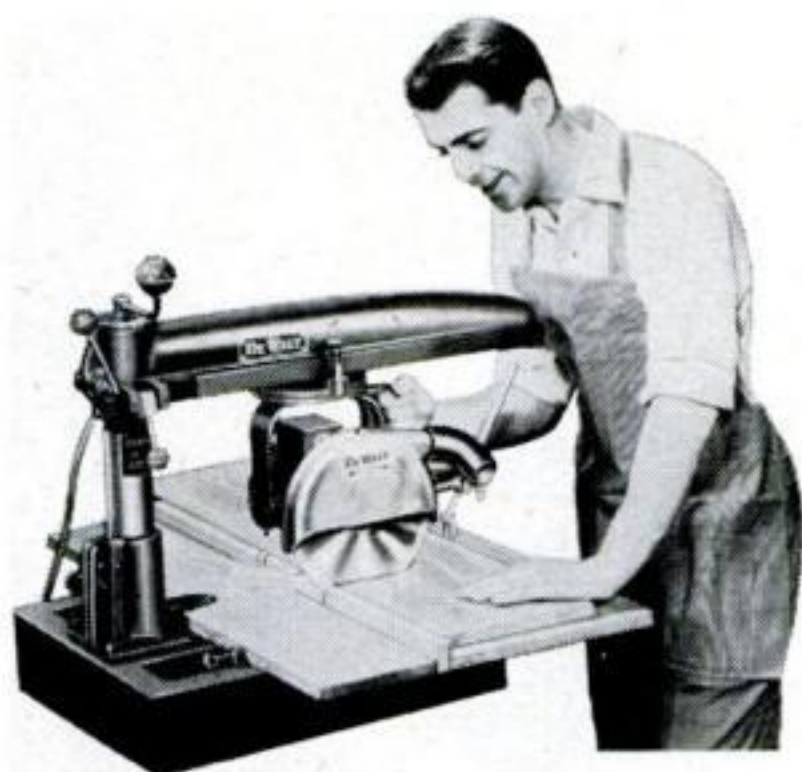
**Getting livelier performance.** Increase the wing angle, up to a maximum of  $120^\circ$ . Australian throwers say that for lively performance and attractive curves, a boomerang should more resemble the moon's crescent than a lath with a right angle. They always make one arm slightly longer than the other, too.

Make the boomerang heavier by increasing the length and thickness of the arms. Sticks 3" thick and 15" to 20" long are not uncommon in Australia. They fly a larger circle, travel slower and rise 50 to 100 feet in the air. END



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MB-F above— $\frac{3}{4}$  hp De Walt-built motor, U.L. & C.S.A. Approved, 9" blade cuts 2½" deep, rips 24" wide... *just \$239 delivered*. Professional size GW-I—1½ hp motor, 10" blade cuts 3" deep, rips 26" wide... \$395.

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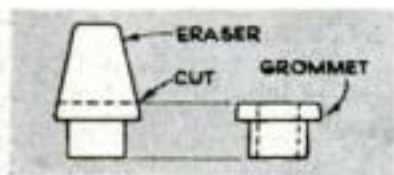
## Portable Sander Makes Quick Job of Frosting Glass

You can frost glass with a flexible emery disk on a portable drill or sander. Steady the glass on a flat surface with brads at the edges. Work from end to end with half the disk in contact and then side to side, overlapping as you go. Blend finally with light, circular motions over the whole surface. A medium or medium-coarse grit is best. Be sure to wear safety glasses and a dust mask.—*L. H. Weber, Havana, Ill.*



## Pencil Eraser Becomes Grommet

NEED a grommet in a hurry for a wiring job? You can make one from a slip-on pencil eraser. Cut off the head and use the neck.—*B. D. Stewart, Winder, Ga.*



## Flasher Identifies Your House

ONE way you can guide friends to your house at night, without confusion, is by flashing the porch light on and off. A bimetallic flasher button slipped into the socket will do the job automatically.—*David Deamer, Westerville, Ohio.*



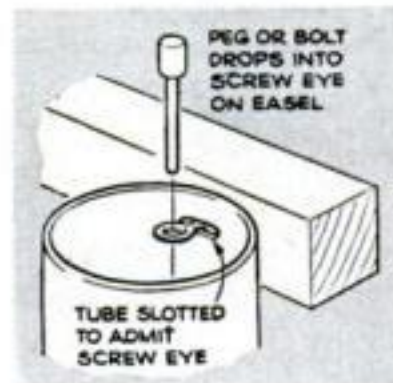
## Clock Doubles as a Protractor

A CLOCK face can be used in an emergency to measure angles for layouts. Line up the work and a ruler with the center of the dial and the appropriate markings around the circumference. Each minute mark represents  $6^\circ$ . Thus five minutes would be  $30^\circ$ .



## Mailing Tubes Hold Brushes

A MAILING tube capped at one end, or a calking container, makes a convenient artist's or sign painter's brush container. To keep used and clean brushes separated, use two tubes. A quickly detachable easel mounting is shown at right.—*Michael Ligocki, Gary, Ind.*





# WARNING!



Today's high-powered engines need frequent spark plug checks to prevent dilution of oil

## Don't change to summer oil without a spark plug check!

*If you haven't checked your plugs in the last 5000 miles, they may be misfiring—and will dilute your new oil with gasoline!*

It's a fact that every time a spark plug misses, raw gasoline remains in the cylinder and drains into your crankcase!

Naturally, this thins the oil so it can't properly protect costly engine parts . . . and may lead to a big repair bill.

So replace winter-worn plugs with new 5-rib Champions *before you change to summer-grade oil!* No matter what make or model car you drive, new full-firing Champions will protect your oil from dilution. What's more—they'll give you quicker starts, greater horsepower—and more miles per gallon of gasoline.

Ask your serviceman to check your spark plugs *today*. If you need new ones, insist on 5-rib Champions—the finest money can buy.



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**CHAMPION**

SPARK PLUGS

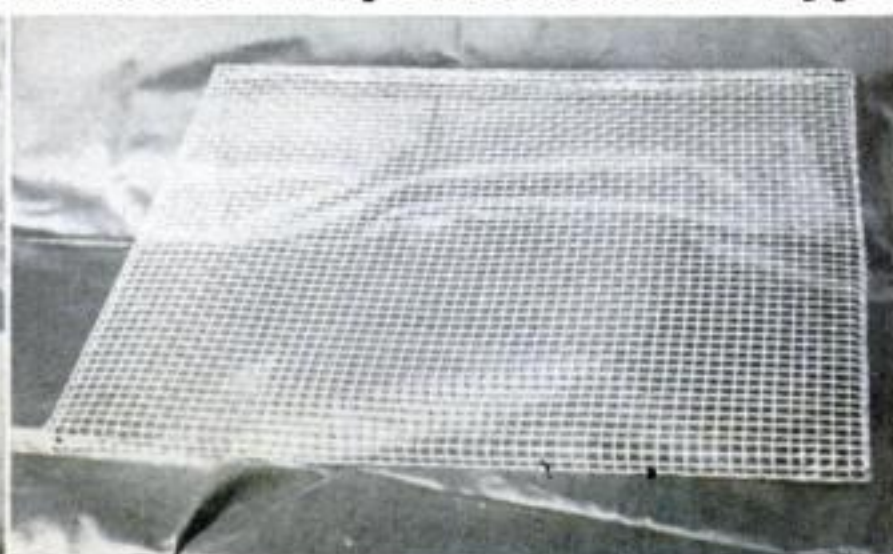


## Three Photo Mats Cut from One Large Mounting Board

I GET three mats from each 16"-by-20" mounting board used for framing an 11"-by-14" print. The 10"-by-13" cutout left after framing the large print makes a good frame for an 8"-by-10" print. The 7"-by-9" piece cut out from this is fine for framing a 4"-by-5" print.  
—G. C. Close, Hawthorne, Calif.



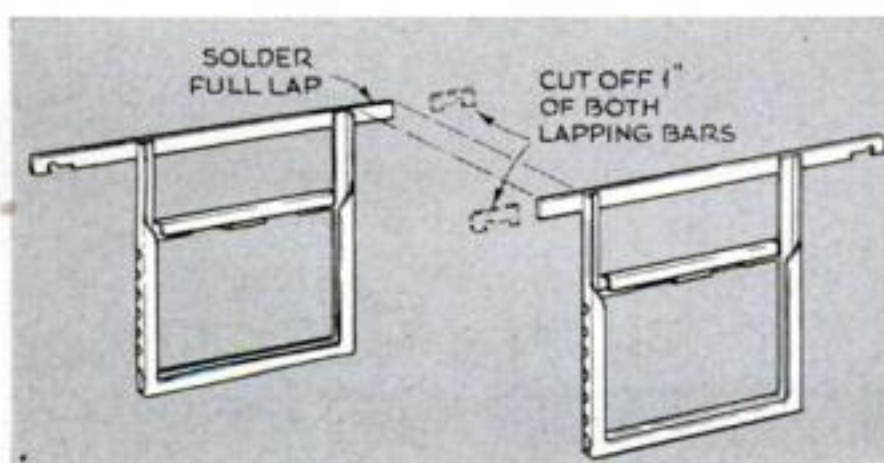
## Wire-Mesh Tray in Bottom of Print Washer Helps Remove the Hypo



BECAUSE hypo is heavier than water, photos that settle to the bottom of a washing tank wallow in hypo concentrated there. This may spoil the prints.

To avoid the possibility of such defects, I have upturned a shallow wire-

mesh tray in my washer. This keeps the prints from dropping into the concentrated hypo below. The tray was made by bending down  $\frac{1}{2}$ " sides on a sheet of  $\frac{1}{4}$ " galvanized mesh and soldering the corners.—L. H. Georger, Buffalo, N. Y.



## Twin Film Hangers Up Output

I SAW this idea used in a darkroom to enable the operator to handle more cut film than he could with single hangers. An inch was cut off the left and right bars of two hangers. Then these stubs were fully lapped and soldered. Tanks to suit the lengthened hangers were used.—A. M. Wettach, Mt. Pleasant, Ia.



The only heavy-duty jig saw on the market able to cut bevels up to 45° angle . . . on either side!



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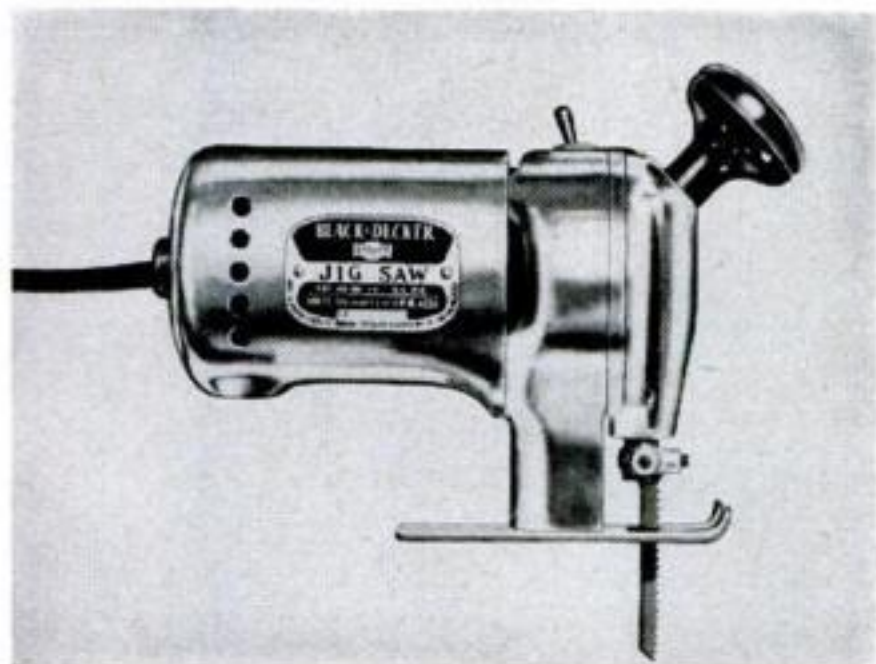
## New *Black & Decker*®

# Heavy-Duty Jig Saw lets you:

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- ★ Cut patterns in heavy stock—even 2 x 4's!
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- ★ Cut sheet steel, curve or straight!

This versatile new B&D Heavy-Duty Jig Saw does *more* than you've ever seen a jig saw do! Runs cooler, even sawing 2 x 4's—powered by a custom-built B&D motor! Notice that *bevel-cutting* feature—think how that will help you

on your job! Makes pocket cuts, too. Full 1-inch stroke for greater speed. See your B&D dealer *today*, or write to: THE ONLY  
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*We don't buy motors—we build them!*



## Wood Strips on Garage Studs Clamp Edge-Glued Boards

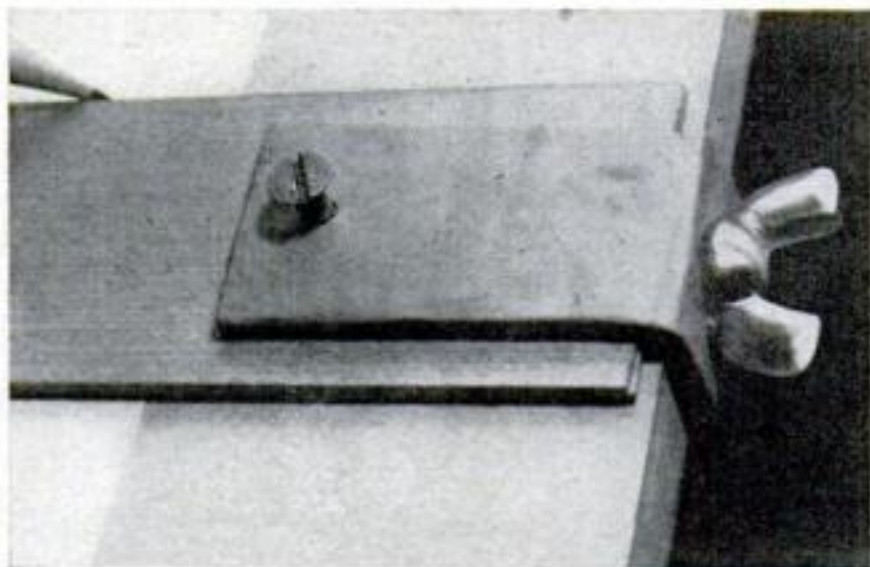
You can press several glued-up boards together by placing them between two horizontal wood strips nailed on the studs of your garage wall if you don't have long bar clamps to do the job. Fasten a vertical strip across the boards to keep them from buckling, and place a loose strip on top of them, as shown at right, to even the pressure of two wedges as they are being driven in from the sides.

## Arrows Mark CD Stations

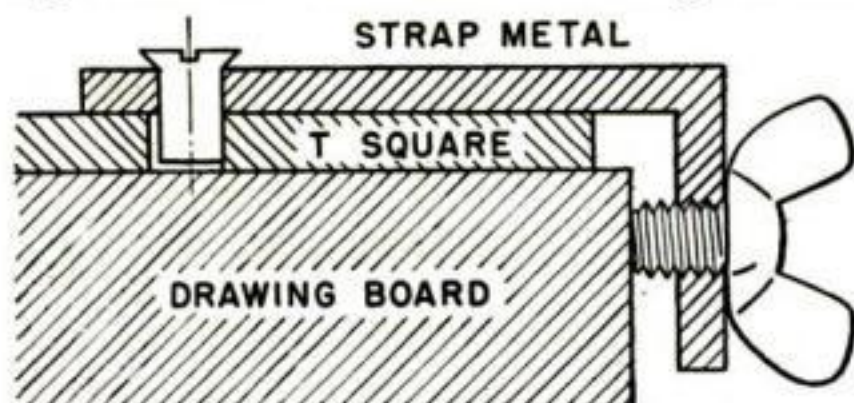
SMALL arrows cut from plastic tape can be used to mark the Civil Defense stations on your radio. You can then dial them quickly in an emergency.



## Clamp Holds T Square Rigid

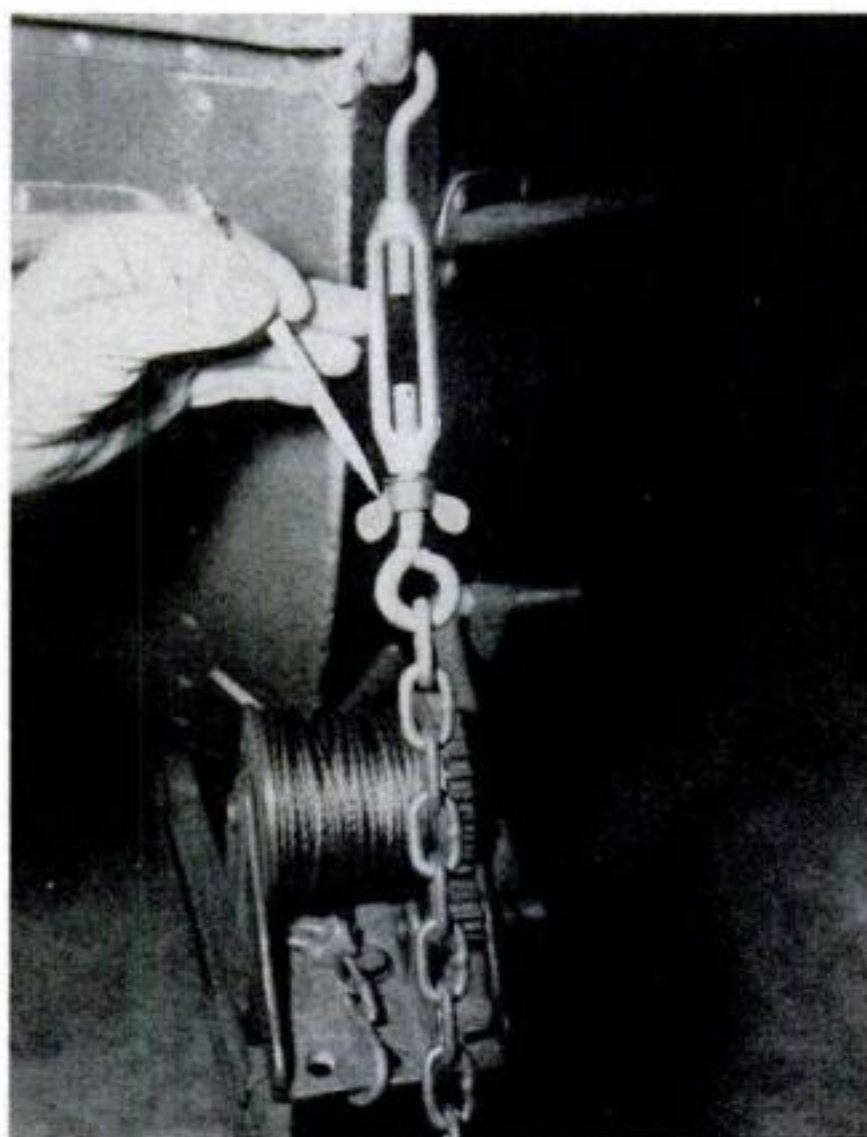


A T SQUARE should be rigid on the drawing board, especially when you are using a lettering template. You can keep it from crawling with a foot clamp which can be made from a bent length of strap iron drilled and threaded to take a wing bolt at the drawing-board edge. Drill the top leg for a pin to anchor it in the hanging hole and onto the drawing board.



## Anchor Chain Can't Loosen

THE chain anchoring a boat to a trailer is not supposed to work loose, but it sometimes does. You can prevent this with a wing nut and lock washer over the turnbuckle as shown below. Turn the nut up snug after the boat is secured.





For your Ford — always specify the brake linings with the

# IRON GRIP

**"Genuine Ford Brake Linings** prove they can keep their iron grip in 3,250 torture tests," says Al Esper, Ford's Chief Test Driver. "In tests like these, inferior brake linings fade. But Ford linings beat the heat and go on to pass repeated 80 m.p.h. emergency stop tests without a falter!"

***Like these brake linings, all Genuine Ford Parts must pass severe torture tests***

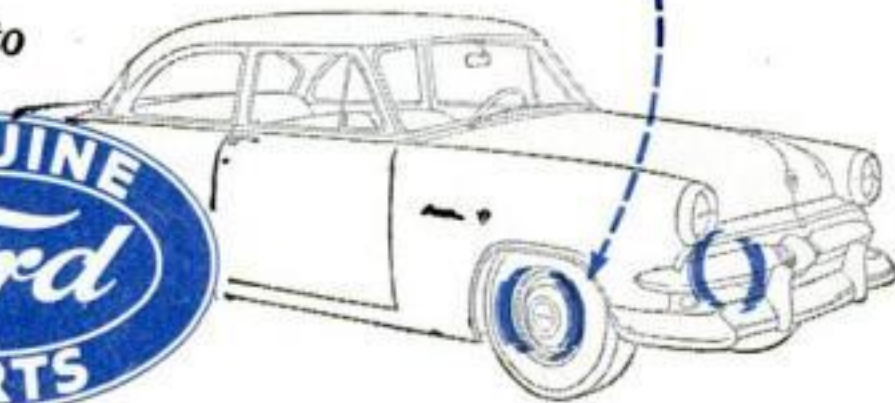
When a replacement will add to your Ford's performance—such as water pumps, shock absorbers, distributor points—make sure it's a Genuine Ford Part.

It will help your car run "like new" because it's built to the specifications set when your car was brand new. You can count on long, dependable service, too, for all Genuine Ford Parts must pass grueling endurance tests before they are accepted for manufacture.

That's why you should always specify Genuine Ford Parts. They're *made right to fit right to last longer in your Ford.*

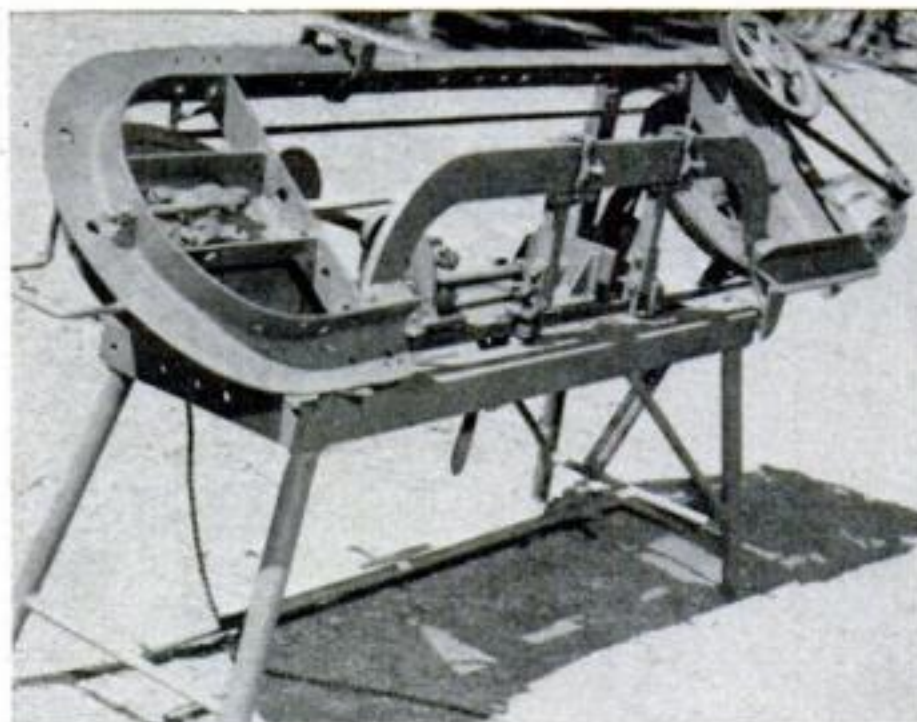
May is National Safety Month—be sure you can see, steer, stop safely!

**Keep your Ford all Ford**





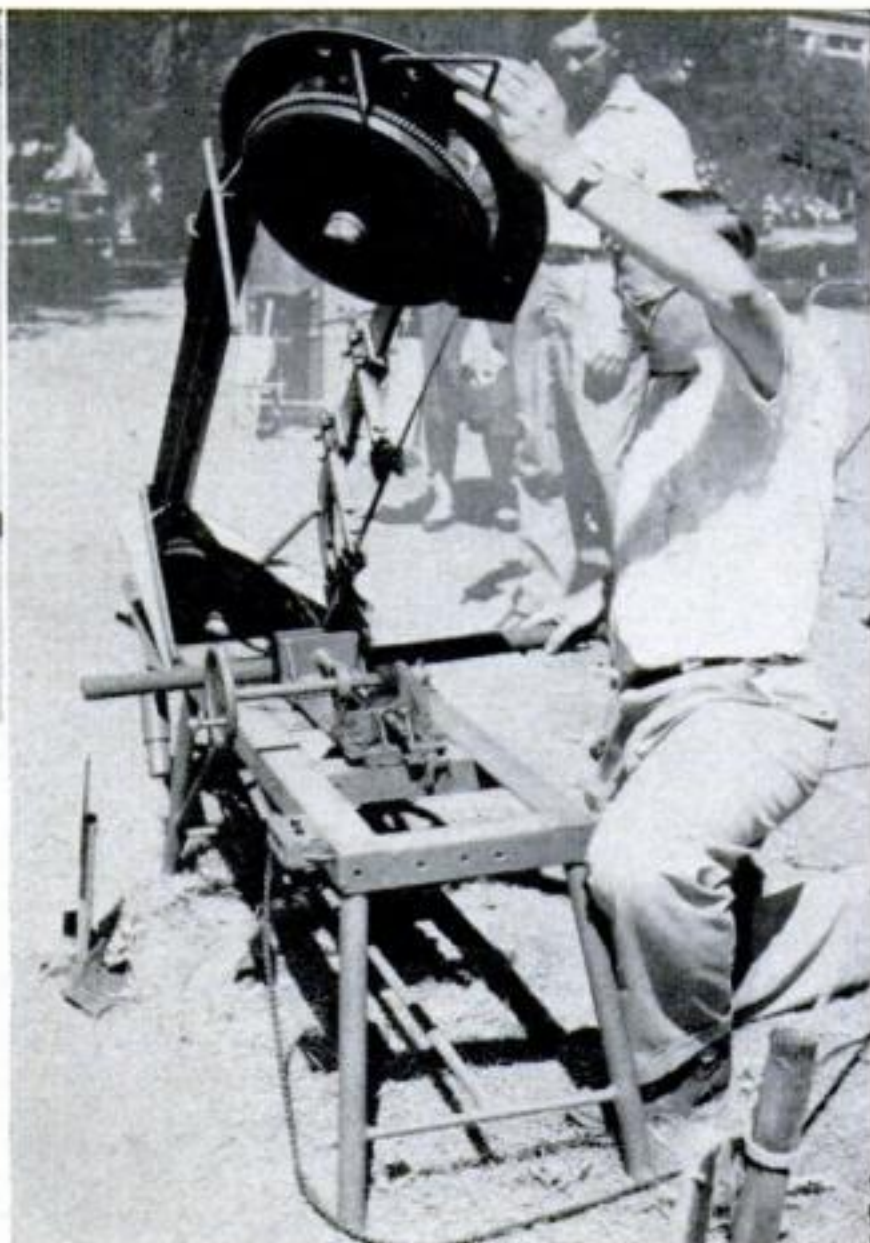
# Homemade Saws Cut Metal with Power



**AN ENDLESS BLADE** does the metal cutting on this machine built by Glen and John Stroburch.

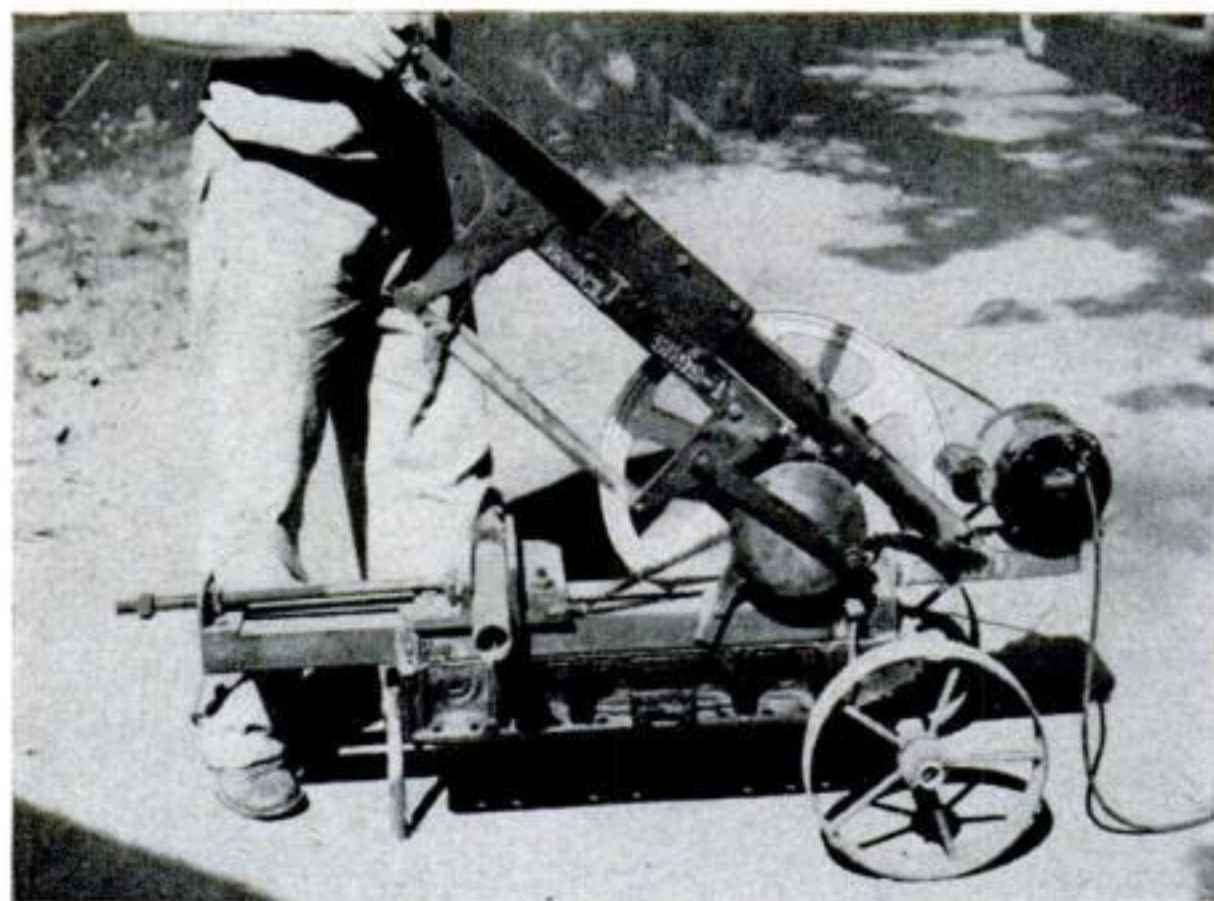
**C**UTTING metal down to size is a job for power. These photos show how it's done on two Iowa farms. The endless-blade machine above, built by Glen and John Stroburch of Blockton, Iowa, uses two old auto flywheels, set atilt so that work can bypass the returning side of the blade. A  $\frac{3}{4}$ -hp. motor drives a counter-shaft geared to one of the flywheels. The base was welded up of iron pipe and angle iron.

Parts of old machinery were cut and welded to make the wheel frame. This is



hinged at one end and counterbalanced by a spring to facilitate lifting it for insertion of work. A handwheel, right-angle shaft and worm reduction move one jaw of the work-holding vise. A switch automatically stops the motor when the blade drops through the cut.

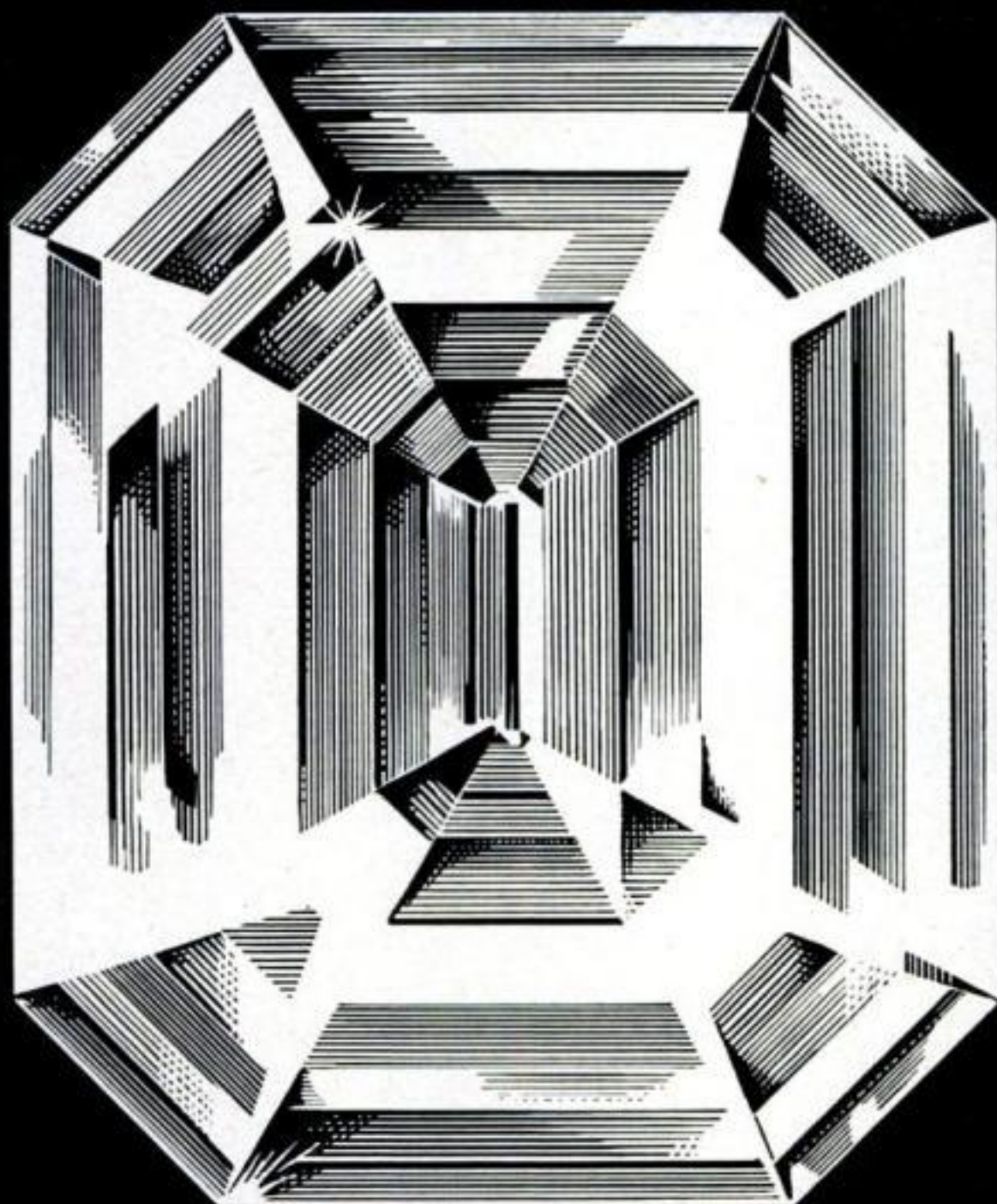
Mounted on wheels so that it can go to the job, the reciprocating saw at left is built on a casting from an old auto engine. This extra weight adds to the rig's stability. Lloyd Marek of Washington, Iowa, used a piece of channel iron as the saw base, and pieces of heavy angle iron as the vise jaws. A direct belt drive from the motor to a large pulley turns the crank disk, from which a pitman works the saw frame.



**RECIPROCATING SAW** has a pair of barrow wheels to carry it to the job on Lloyd Marek's farm. The crankshaft is belt-driven.



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# Folding Anchor Stows Away Flat in Small Boat



**PRESS DOWN ON THE BODY** of the anchor, compressing the springs inside. Swing the top spring parallel to the bottom one to close.



**IT STOWS AWAY LIKE THIS.** Note the two projecting rods that serve as stops for the hooks.

**T**HE usual anchor is an awkward thing to stow away in a small boat. Here's one that isn't. Its hooks pivot from right angles into the same plane so that the anchor will store flat.

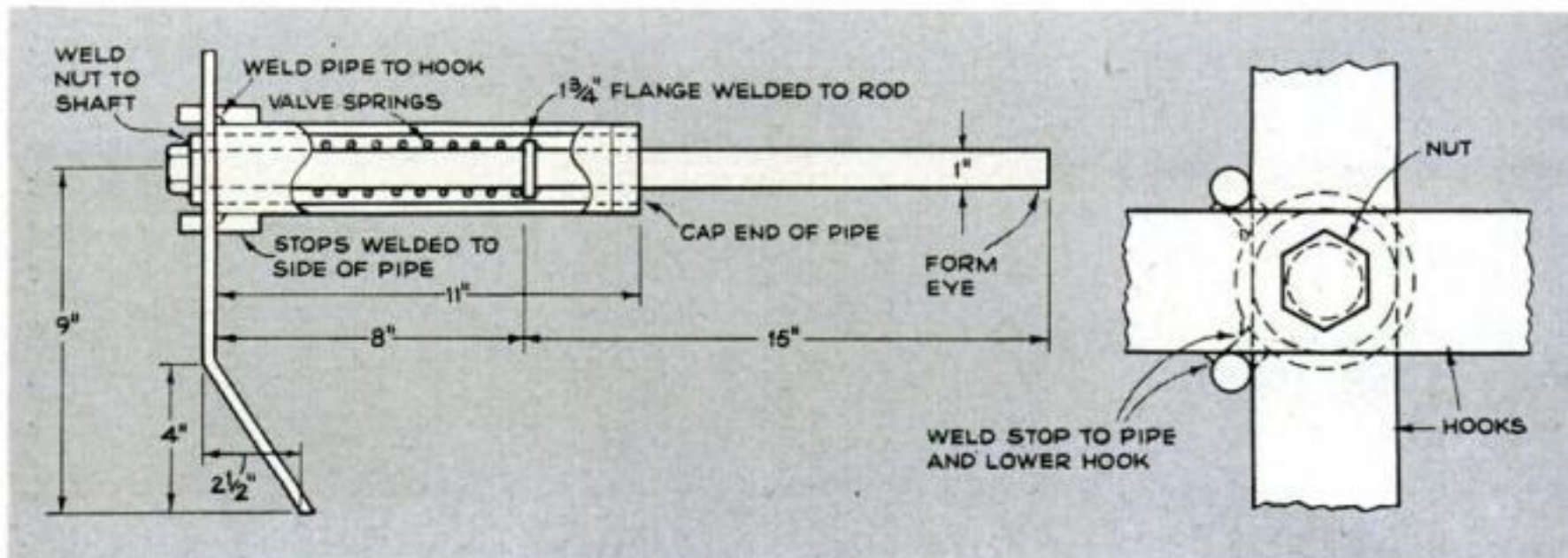
To make it, you need two leaves from an automobile spring, four auto valve springs, an 11" piece of 2" pipe, a 1" rod 23" long and odds and ends of metal. The parts are welded together.

Thread one end of the rod for a suitable nut, and weld on a 1 3/4" flange 8" from the threaded end. This flange serves as a stop for the valve springs.

Burn the ends of the spring leaves to a point and burn a center hole in each one for the rod. Heat and bend the spring tips to the angle shown in the drawing below. Cap one end of the pipe and drill a 9/16" hole in the cap for the rod.

Slip the valve springs over the rod, then the two spring leaves and secure them with the nut. After slipping the pipe on the other end of the rod, encasing the valve springs, weld the pipe to the spring leaf that it butts against.

Now pivot the top leaf into the open position—that is, at right angles to the one beneath—and weld two 2" pieces of rod to the pipe and lower spring leaf. These pieces serve as locking bars to hold the top leaf in either the open or closed position. The pieces should project about 3/4" above the top leaf. Weld the nut to the rod to keep it from loosening. Then heat the other end of the rod and form an eye for securing the anchor line.—*John O. Bock, Yakima, Wash.*





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*James D. Stewart*

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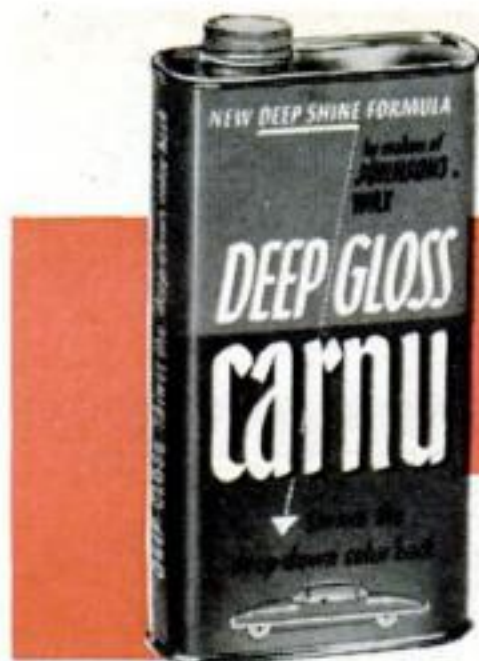
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"Peculiar," he remarked. "This motor is sweet. Yet it seems draggy on a get-away from a stop."

"That's what the other mechanics told me," Tethrow blurted out, and sudden embarrassment came to his features. "That's why—well, I heard it around that you were super on deals like this, Gus. Everybody's tried to fix it, and then, with this stuff you told me about trying to be like this Hank character, I thought for sure that you could..."

SO, Gus thought, this kid hadn't come to his place to hang something on the chairman of the Traffic Safety Committee. He had come expecting Gus to be able to put his hand on the trouble. And what had been Gus's reaction? He'd puttered around, handing the kid a lot of tripe about Hank Scofield, who was nothing more than a freckle-faced rogue who liked to fish and hunt too well to get into trouble.

Gus walked around the car, listening to the exhaust from the idling motor. He placed a hand on a rear fender to support himself as he stooped low to knock the dottle from his pipe on the heel of his shoe. He sniffed sharply. When he straightened up, his face held a thoughtful look.

"Speaking of Hank Scofield," he said, "I reckon that if I went to him with a bellyache and told him to take out my appendix, he wouldn't do it until he'd checked everything. There could be something holding this car back that a motor tune wouldn't correct."

Gus pulled the car over on the shoulder and got out. He removed the fuse from the yellow wire that led from the anti-creep pressure switch to the hot lead, which was a part of the automatic drive. Driving the car again, it shot away like a bullet.

"Man!" Tethrow breathed. "She moves out now. You fixed it."

"We haven't fixed it—not yet," Gus told him. "We've just located the trouble spot. It wasn't in your motor at all. It's

somewhere in the anti-creep system of your automatic drive."

"Come again?" Tethrow said, with a puzzled expression.

"WELL," Gus told him, "with this type of drive, when I put on the brakes to stop, ignition switch on, idle-adjusting-screw switch closed, as it would be with the accelerator not depressed, the anti-creep circuit is closed, which energizes a solenoid valve that holds brake pressure on the rear-wheel brakes. With this brake pressure on the rear wheels, any tendency for forward creep in the car is halted."

"Holy cow!" Tethrow exclaimed. "Feed me that line slowly. What has this got to do with slow pickup?"

"When I depress the accelerator in starting up," Gus explained, "the circuit is supposed to open at the idle-adjusting-screw switch of the anti-creep system, de-energizing the solenoid and releasing the brakes instantly. It wasn't doing this. This let me know that the trouble was in the anti-creep system, but I didn't know whether it was mechanical or electric. To narrow it down I removed the fuse to break the circuit of the system. If our brake drag hadn't been gone I'd have known the trouble was mechanical. As it is gone, I know it is electric. You'll eat up stuff like that, Bob, when you get through engineering college."

"How about that!" Tethrow exclaimed. "But how do you fix it?"

"In this business," Gus told him, "locating the trouble is 90 percent of the battle. It's probably either a grounded wire from the idling switch to the anti-creep solenoid, or a grounded anti-creep solenoid coil. It could be in the switch itself. We'll drive back to the shop and find out."

BACK at the garage Gus checked out the switch and the switch-to-solenoid wire, finding them to be all right. A test of the solenoid proved that it had a

*[Continued on page 244]*



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of the double-taper ground blade of perfectly-tempered steel. Then use the D-23—and enjoy the extra satisfaction that comes with using a fine tool.

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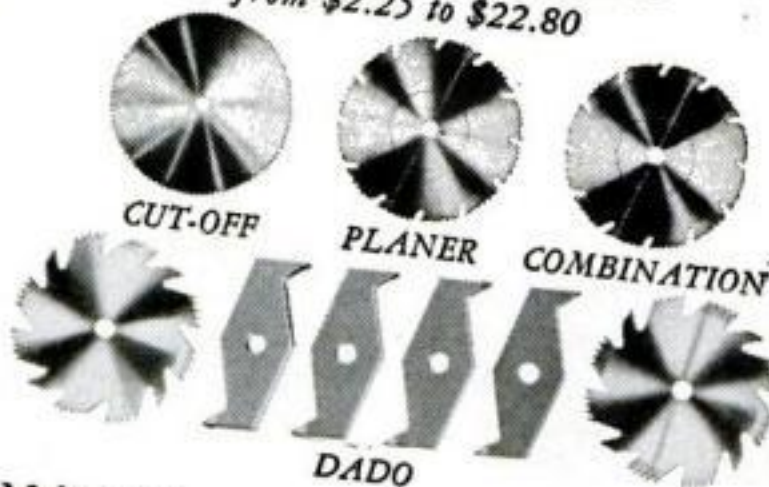
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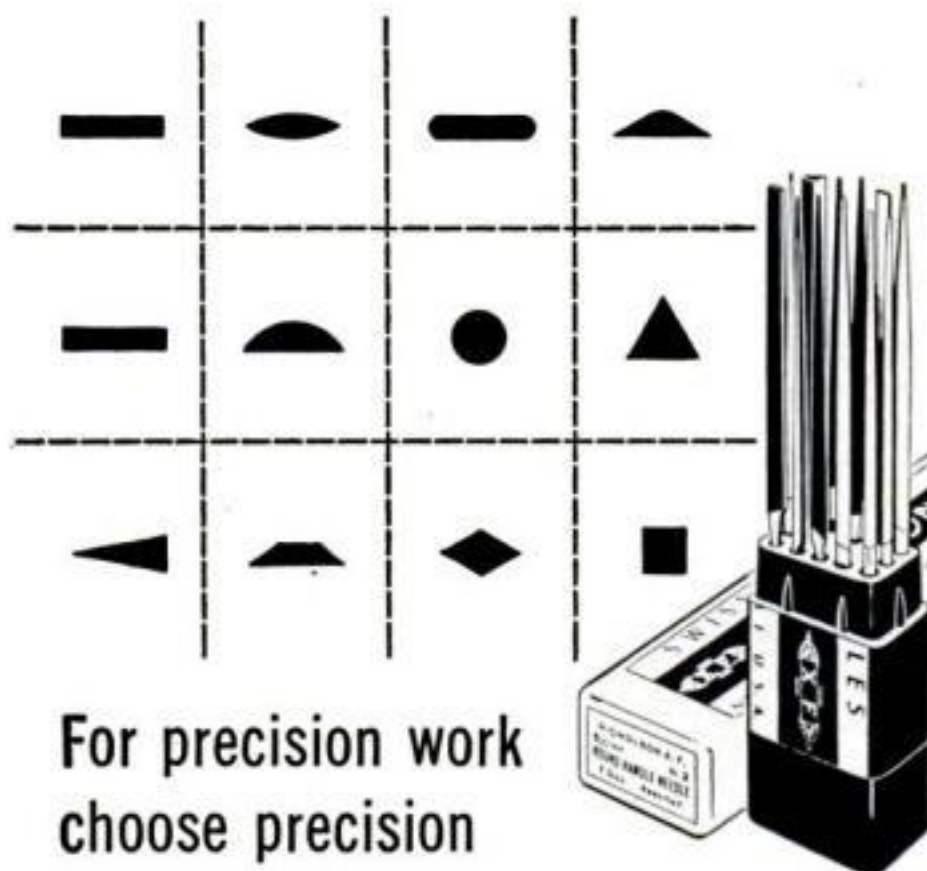
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**NICHOLSON FILES**  
**A FILE FOR EVERY PURPOSE**

### Gus Cools Off a Hot-Rodder

[Continued from page 242]

grounded coil. Installing a new solenoid corrected the trouble, as another road test proved.

"I've been thinking," Tethrow told Gus as he prepared to drive out of the Model Garage, "about what you told me about this Hank Scofield. Do you really think, Gus, that the fellows around town sort of—well, you know, sort of follow my lead?"

"That's right," Gus told him. "But don't ask me why. That's just the way it seems to work out for some men. Tough, in a way."

"Tough? How do you mean?"

"Well," Gus said, "it's a sort of unasked-for responsibility, just like with Hank. He got a crew haircut, we got them. He played hooky, we played hooky. You know. You squirrel this bus in traffic, they squirrel theirs. If any of them get hurt doing it, you might feel sort of responsible. It's tough in a way, but it's also a real honor, Bob. Like I said, if a fellow pulls it off all right, he has a right to pat himself on the back for a job well done."

**S**TAN Hicks came over to stand beside Gus as he watched Bob Tethrow pull up at the stop light down the street.

"Hah," Stan said. "Watch him try to beat everyone to the gun when the light changes, tires howling, dual pipes spitting fire."

"Want to bet?" Gus said softly.

"Well, I'll be darned!" Stan burst out as young Tethrow's car pulled out at a normal pace when the light turned green. "What did you do to that kid, Gus—read him the riot act?"

"Who me?" Gus asked in apparent astonishment. "Heck, no. All I did was to reminisce about my kid days and a guy named Hank. I probably seemed an awful drip to young Tethrow. But not as much of a drip as I would have if I hadn't happened to stoop over at that rear wheel to knock out my pipe, and smelled hot brake lining." **END**

**NEXT MONTH: Gus baits a trap for a phony.**



# IDEAS FROM WELDWOOD

## The Weldwood Question Box

**Q.** The doors in our house seem to transmit a lot of noise. How can this be corrected?

**A.** If wide cracks around the door are responsible for your problem, seal them with felt or rubber weatherstripping tacked to the door frame. But if the noise is coming *through* the doors, your best bet is to replace them with Weldwood Stay-Strate® Doors. The mineral core cuts noise transmission and, because Stay-Strate Doors won't warp or shrink, you'll effectively reduce sound *around* the doors.

**Q.** Must I use sheathing behind exterior plywood walls?

**A.** Yes—with three exceptions. Weldwood Texture 111, Exterior Weldtex® and Duraply® are approved by federal housing authorities in many areas for use without sheathing—a real saving of time and money. Check your local building laws first, though.

**Q.** How can I give birch plywood a natural finish?

**A.** It's easy. Go over plywood with No. 4/0 sandpaper—apply two coats of Satinlac®—let dry—then steel-wool and wax. For a "pickled" finish, first apply a coat of white Firzite®. Let stand a few minutes—wipe off with a clean cloth—follow with two coats of Satinlac, as above, then wax.

### GOT A QUESTION?

Send it to "The Weldwood Question Box,"  
55 West 44th St., New York 36, N.Y.

## THIS MONTH'S PROJECT—

## THE "SINBAD" AQUA-SLED



Here's a project for family fun— assembling the "Sinbad" Aqua-Sled. "Sinbad" is more than just a new class of sailboat, it's an aqua-plane and surfboard, too. (To get "Sinbad" kit, see coupon.)

"Sinbad's" makers—like many fine boatbuilders—use new Duraply for sound construction. Duraply, you know, is a *new type* of plywood: waterproof plywood with a special overlay permanently bonded to its surface. This super-smooth surface needs less paint than ordinary wood; paint lasts longer, too. And there's no sanding, no primer, no sealer coat. The tough overlay stands up to banging and pounding—helps "Sinbad" look better longer.

## This month's hints

**1. Make an inexpensive dining room table . . .** quick to build, for your summer cottage, handsome enough for your own dining room. Buy one Weldwood hollow core flush door—they start from about \$15—screw wooden or metal legs to the solid part of the door (around the edges), and you're

done! Weldwood flush doors come in a variety of beautiful hardwoods. You'll have no trouble matching wood you have in your room.

**2. Finishing exposed plywood edges** of tables or furniture is easy now. Get out your Presto-Set Glue and apply Weldwood Flexible Wood-Trim®. Comes in easy-to-use rolls 1" wide, 8' long. It can bend around corners . . . and matches wood perfectly because it's *real wood* itself.

### \$10 For your ideas

for "This Month's Hints." (Hints must apply to some Weldwood product.) Send them to "Weldwood Hint Editor," 55 West 44th St., New York 36, N. Y.

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RUSH ME all the information and descriptive literature about "Sinbad" Aqua-Sled kits and Weldwood Duraply. PS-5-56

Name.....

Address.....

City.....State.....





**Chuck Stevenson**, ace driver of NASCAR (National Association for Stock Car Auto Racing) says:

**"Here's the oil filter we pro drivers use!"**

**—Purolator is best for every make of car!"**

**Protect your car like the "pro's" do!** Driving cars just like yours, 9 out of 10 NASCAR drivers choose Purolator oil filters . . . find they trap up to 3 pounds of grit in every race!

Purolator Micronic filters stop dirt fine as 39 millionths of an inch . . . have up to 10 times greater capacity than many oil filters.

Ask your serviceman to put in a Purolator refill every 4000 miles—when he changes your oil. Takes only minutes. From \$1.60.

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"Purolator" and "Micronic," Reg. U. S. Pat. Off.

**Proved best for every make of car**

**PurOlator**  
OIL FILTERS

## It's Easier to Stop Termites Now

[Continued from page 185]

is used to lubricate your auto springs).

Basementless houses built on concrete slabs are particularly troublesome. Often the termites live underneath the slab, where the house is warm. They find their way to the wood frame through cracks in the slab, expansion joints or holes around piping and wiring. They often attack the sole plate supporting wall studs if this member is buried in the slab.

The only way to rid a slab house of termites is to soak the soil under the slab with insecticide. Drill  $\frac{1}{2}$ " holes in the floor at 18" intervals in a staggered pattern. Through these pour a quart per square yard area of sodium arsenite or

.....

*All you have to do to make a neighbor pay attention to what you are saying is to get into an argument with your wife.*

—THE SIDEWALK SUPERINTENDENT

.....

pentachlorophenol in water. The holes must be drilled with great care to avoid damage to wires and pipes in the slab.

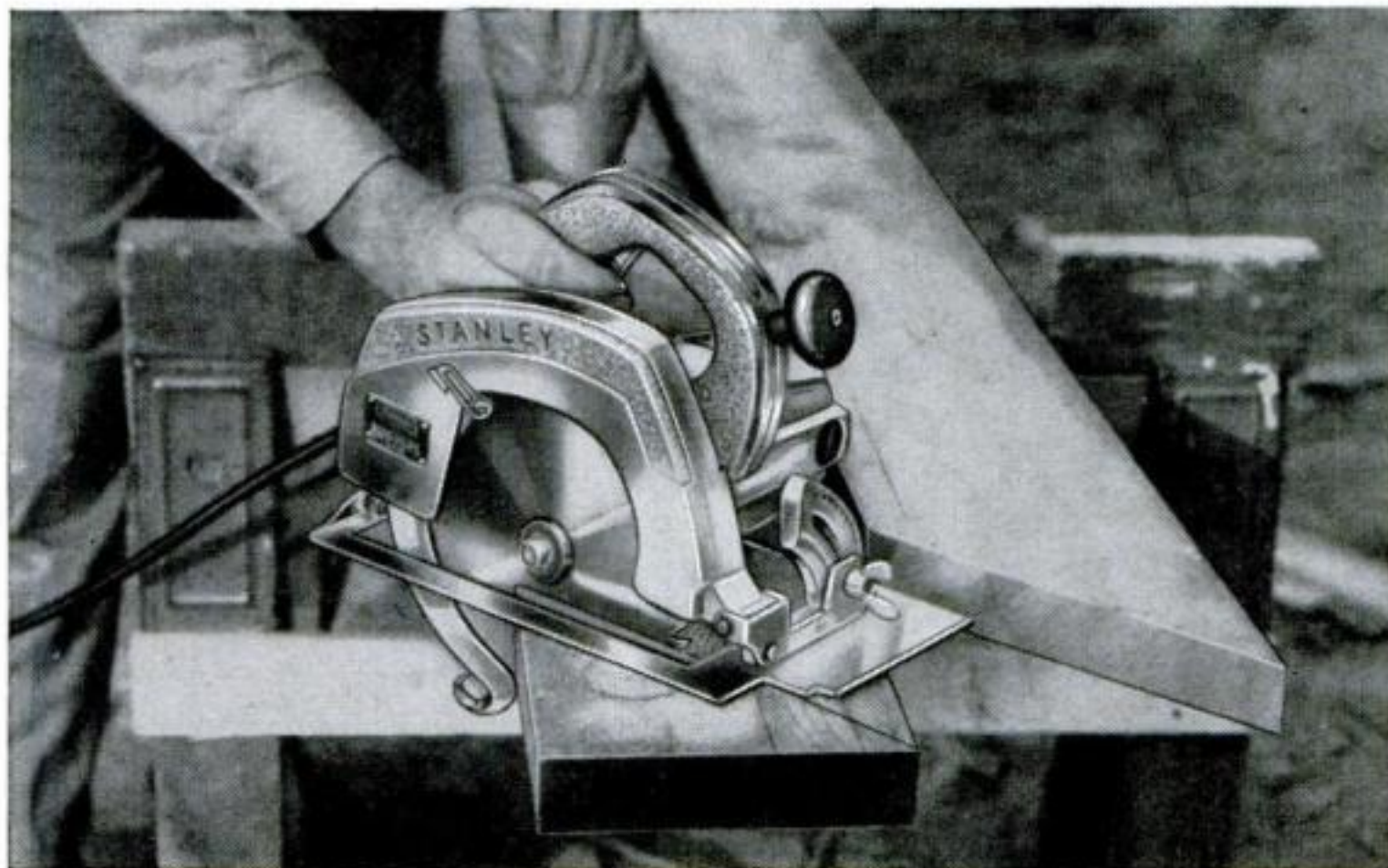
**Keeping termites away.** Good house-keeping will do a lot to prevent termite attack. The most important point is to eliminate any wood or dirt pathway between the soil and your house frame. Make sure that at least 6" of masonry separates siding from the ground. Remove dead vines and leaves from foundation walls. Keep wooden trellises and fences 6" or more from the house.

If you can, get rid of old wood in or on the ground near the house—it may attract termites which can later move into the house. Soak the ground around tree stumps with chlordane.

Dampness is essential to termites, and they can live in very wet wood without any connection to the ground. If your house is built over a crawl space, make sure that it is well ventilated, with at least three square feet of screened and louvered vents for every 25 running feet of foundation. Dirt floors should be covered with 55-lb. roll roofing. Rain leaks are another source of danger. **END**



# new saws that DO MORE and COST LESS



Whether you prefer a 6", 7" or 8" saw, Stanley makes them all . . . and all for, heavy duty. Now at reduced prices.

6" H65 cuts 2" at 90° — 1½" at 45° and retails at \$59.95.

7" H70 at \$69.95 cuts 2¾" at 90° — 1¾" at 45°.

8" H85 at \$79.95 cuts 2⅞" at 90° — 2⅛" at 45°.

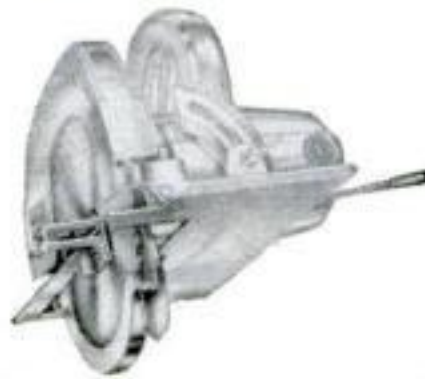
## STANLEY BUILDERS SAWS . . . the finest you can buy



**The "Motor Saver"**  
*Power plus protection!*

**Exclusive** Stanley drive protects saw motor against impact shock when blade hits nails, etc., and ensures full cutting power at all other times.

Featuring . . .



**The "Free-Start" Guard**  
*Ease of operation!*

**Exclusive** Stanley blade guard makes starting cuts accurate and easy. Guard never sticks regardless of angle of cut . . . no "hang-up" or "drift" in starting.

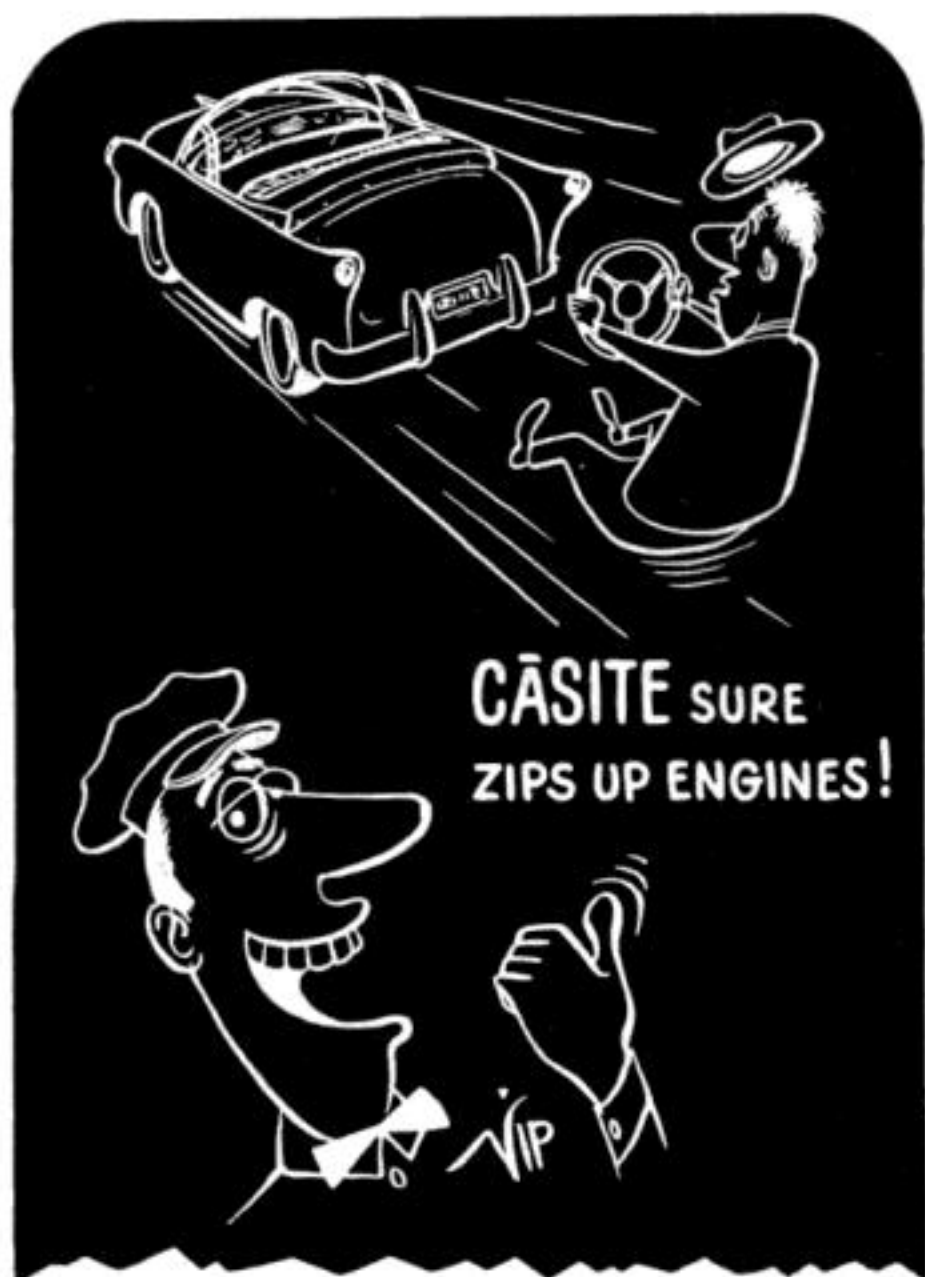
Look for these fine saws. Your dealer can supply you or obtain them promptly for you. For free power tool catalog No. 400, write Stanley Electric Tools, 635 Myrtle St., New Britain, Conn.



# STANLEY







# TUNE-UP when you GAS-UP

A pint in the crankcase . . . a pint through the air intake . . . restores pep and performance—frees sticky valves and rings—keeps your engine clean or *Double-Your-Money-Back!*

## CASITE



HASTINGS MANUFACTURING CO., HASTINGS, MICH.  
Casite, Wear Reducer, Piston Rings,  
Oil Filters, Spark Plugs

## You, Too, Can Be a Motorman

[Continued from page 103]

One car is a 75-year-old, two-hp. horse car from Toronto. Another is a great 75-passenger open car that once transported a generation of fans to Yale football games. Others range from mail cars and snow sweepers to a haughty interurban, an ancient Toonerville and a swank parlor-car trolley, complete with wall-to-wall carpeting and wicker easy chairs.

These cars belong to the several hundred members of the Branford Electric Railway Association, a group of men who happen to be crazy about trolleys and are willing to undertake prolonged and exhausting labor to restore ancient specimens. Some are primarily interested in

.....

*How good a red hot idea is usually depends on how much heat it loses when somebody throws cold water on it.*

—THE SIDEWALK SUPERINTENDENT

.....

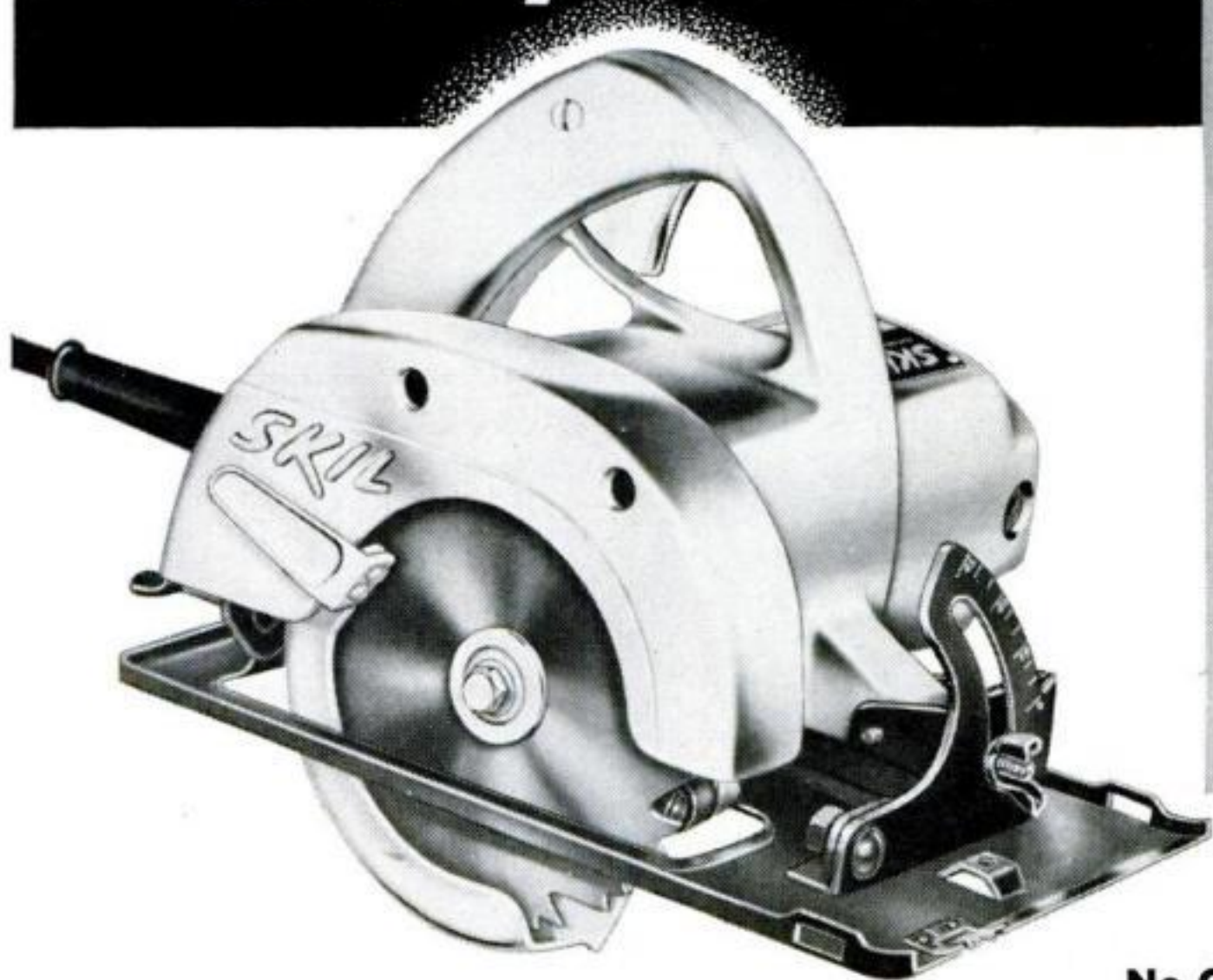
motors, controllers and wiring; others are happiest when they are putting a sheen on time-dulled brass fittings, or restoring peeling, blistered cars to their original bright colors. Some are old-time motormen or conductors who still like to work the coffee-grinder controls of a trolley and clang the gong.

**Free rides.** Once the trolleys are ready for the rails, members take turns running them over the picturesque stretch of track that BERA obtained when it was formed, back in 1945. On fair Sundays they invite the public in to see the cars and to take free rides.

The power supply for running the old cars comes from two 400-hp. diesel-electric power plants taken from an early streamliner. One diesel had a hole in its head and was bought only to be cannibalized; the other was well worn. A group of members pitched in, rebuilt the usable machine, set it up in the Quonset car barn and wired up a full-dress control panel for it. Now the diesel can put out 550 volts of DC, although it's usually held down to 375 to coddle the ancient motors and controllers. **END**



# Now! The builders of over a million power saws offer a **GENUINE SKIL SAW** for only \$29.95



Why settle for less when you can own a *guaranteed* SKIL Saw for only \$29.95! At this low price no craftsman can afford *not* to have a SKIL. The real thing in portable saws—with all the power and performance you'd expect of a SKIL! More cutting ability than any other saw in its price range regardless of size . . . speeds through the toughest materials without stalling or burning out.

Capacity to spare, too. This highest-quality SKIL will cut paneling, wall-board, Formica and other materials. Handle 2 x 4's with the 4 1/4" blade saw simply by flipping the board. Make 45° cuts to a depth of 1"! Vertical cutting depth is 1 5/32". Here is an ideal investment for home or shop. Let this new SKIL help you clean up all the hobby or building jobs that need doing. Ask for demonstration at your Hardware Dealer's today.



• Make cabinets, cupboards, closets, an easy weekend project with SKIL Saw!



• Extra rooms, extra storage space. It's easy to build them with SKIL Saw!



• Cut paneling, shelving, siding, or plywood. SKIL handles them all.

## Model 504 No Other Saw in This Price Range Offers These Famous SKIL Features

- Powerpacked motor • Guard-lift-Depth and bevel adjustments • Trigger-type switch • Built-in sawdust blower
- Telescoping blade guard • Comfort-grip handle • Fully backed by the famous SKIL standard guarantee.

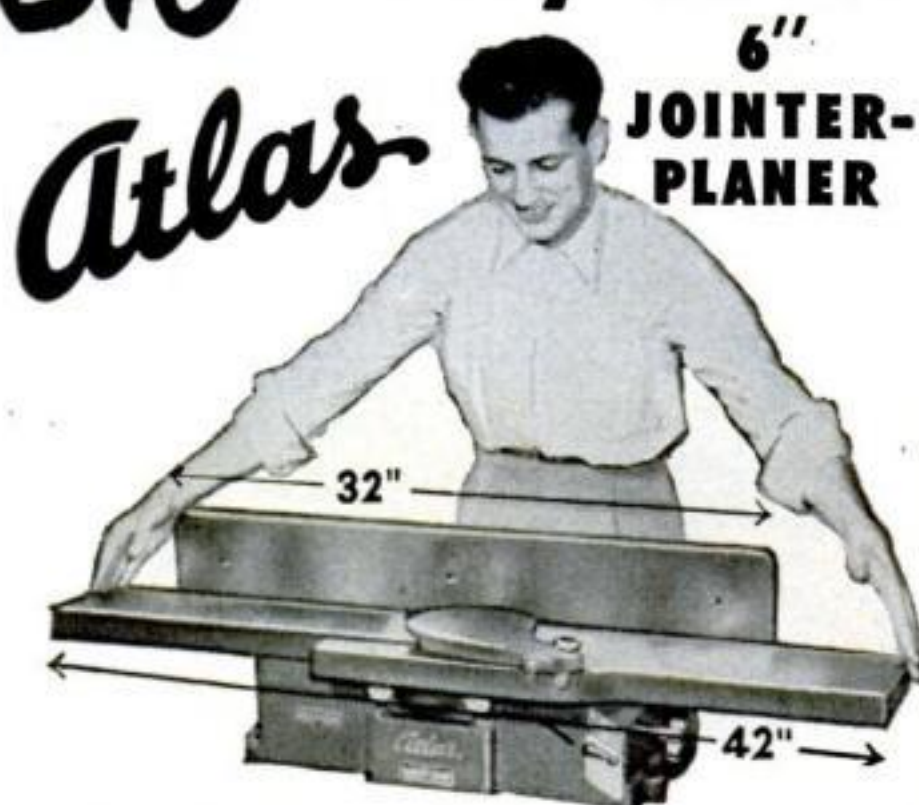
# SKIL

**BUILDERS TOOLS**

Made Only by SKIL Corporation, Formerly SKILSAW, Inc.  
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Factory Branches in ALL Leading Cities



# BIG Money-Saver



## For Furniture, Remodeling, Construction

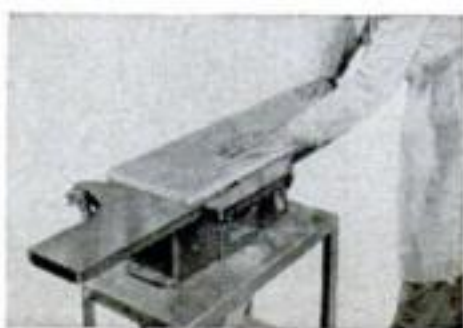
Whatever you want to do—"finish out" a house or a room, remodel, make kitchen cabinets or furniture—this Atlas 6" jointer-



New type fence mount assures fast set up—greater rigidity and accuracy.



Cutter head removes for sharpening blades without disturbing their setting.



Rear table is wide to support big boards.

planer is the tool to own.

You can plane mirror-smooth surfaces in seconds with the Atlas—rabbet, chamfer, taper, edge.

Table and fence are both big for big board work . . . precision-ground for smoothness and accuracy. Fence is rigid—triply supported, easily positioned, has width-of-rabbet scale.

Atlas has no equal in value for the home shop, contractor, or commercial shop. See it at your dealer's, or send post card or coupon for catalog.

### NEW MODERN FURNITURE PROJECT BOOK

16 complete, easy-to-follow plans for beautiful modern furniture . . . chairs, lamps, tables, etc. Build your own! Have fun! Save! — Only \$.50 postpaid, \$.65 outside U.S.A.



ATLAS PRESS CO.

525 Pitcher St., Kalamazoo, Mich.

Please send catalog showing jointer-planer. Inclosed is \_\_\_\_\_ for \_\_\_\_\_ plan book.

Name \_\_\_\_\_

Address \_\_\_\_\_

City, State \_\_\_\_\_

## 40,000-Mile 'Road to Everywhere'

[Continued from page 144]

As on today's superhighways—like the Ohio and New Jersey Turnpikes, and the New York Thruway—which it will closely resemble, the Interstate system will have limited access. This means that garages, drive-in stands, stores and all the rest cannot spring up along it and clog traffic, as they have in the past.

**Interstate vs. toll roads.** The Interstate will not, for many years at least, compete with today's toll roads. That's because the states, which will build the system, will not lay down new free roads parallel to toll highways until bonds of the toll roads are redeemed. In some cases, however, proposed toll roads may be built as Interstate free highways—if more Federal money is available than was the case before.

There will be no sharp grades on the whole Interstate network—not even where you cross the Rockies at the California, Oregon or Washington state lines.

The many lanes will make possible easy passing of cars ahead of you. The easy passing, in turn, will eliminate long queues of traffic—and nervous irritation.

The hazard of monotony felt by drivers on long, straight roads will be reduced, Royall anticipates, "by some slight winding or curvature. But not by a whole lot of curves to make the highway snaky across a Kansas prairie."

"You won't need to think about watching signs," says Royall, "till you near the point where you're going to turn off." The Interstate, which will include parts of many U.S. highways, will have its own distinctive marking, Royall expects. This will be determined by the American Association of State Highway Officials.

All of the features of the Interstate mean that upon it you'll be able to maintain, with no stops and few slowdowns, about 60 m.p.h. all day. Speed limits, as now, will be set by states.

To provide Americans with these free-ways to everywhere will take, Royall says, "mankind's biggest building job."

Last year, the American Society of

[Continued on page 252]



Shop by MAIL and

FOR HOME, FARM & FACTORY

# Save SURPLUS & NEW MANUFACTURE EQUIPMENT

at GROBAN'S

All Items Unconditionally Guaranteed

## BRAND NEW 1 H.P. 12 Volt Electric Motor



ITEM NO. 308

Rated 1 H.P., 100 amps., 5000 R.P.M., 12 volts, D.C.—This double shaft motor of ball-bearing construction may be run on 6 volts for lower horsepower requirements.—Standard  $\frac{1}{2}$ " shaft, flange mountings.—Dimensions:  $9\frac{1}{2}$ "x $4\frac{1}{2}$ "x $4\frac{1}{2}$ ". Ship. wt. 19 lbs. A real value at..... **12.50** F.O.B. Chicago

## SELF-PRIMING ALL BRONZE & MONEL GEAR PUMP

ITEM #383—USE FOR:

• Sprinkling • Irrigation • Insecticide Spraying • Sump Pump • Fuel Transfer • Home Water Systems • Dewatering • Salt Water, Chemical, Acid Pumping



**FEATURES** • Needle Bearing Construction •  $1\frac{1}{2}$ " Pipe Thread Inlet,  $1\frac{3}{4}$ " Hose Outlet • Standard  $\frac{3}{4}$ " Keyed Shaft • All Bronze Body & gears, Monel Shaft • Equipped with Drain Cocks, Grease Cup, Steel Internal Drive Gears for long, trouble free service.

**CAPACITY:** From 10 to 80 Gal. Per Min. At Speeds from 550 to 2400 Rev. Per Min. Using from  $\frac{1}{2}$  to 16 Horse Power. For Pressures to 160 lbs. Ship. Wt. 58 lbs. U. S. Navy Cost \$168.00.

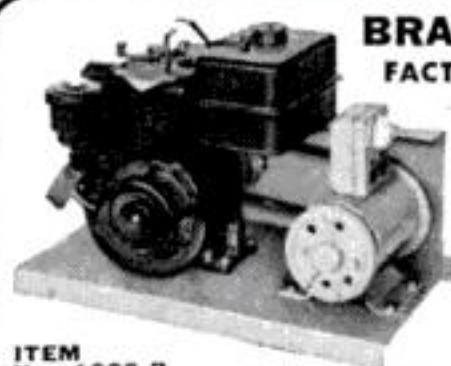
F.O.B. Chicago **39.50** Ea. Two for 75.00

## GROBAN FOUR-WAY OPEN CENTER HYDRAULIC CONTROL VALVE

**ITEM #126** — Four-way open center control valve, with built-in adjustable relief valve factory set at 1000 P.S.I. Spring loaded neutral position. For use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Can be used as single unit or mounted in series. Has  $\frac{3}{4}$ " pipe thread inlet and outlet.  $\frac{1}{2}$ " pipe thread cylinder ports. Finger grip handle. Ship. wt. 10 $\frac{1}{2}$  lbs.

AN OUTSTANDING BUY!

F.O.B. Chicago **21.50**



## BRAND NEW 1956! FACTORY-TO-YOU-VALUE

## PORTABLE ELECTRIC LIGHT PLANTS

ITEM  
No. 1008-B

Dimensions:  
Length 20 $\frac{1}{2}$ "  
Width 12"  
Height 16"

**POWER TO OPERATE:**  
• Water pump, Radio, Lights, Air-conditioner • Refrigerator, Deep Freezer, Incubator • Electric Saw, Electric Drills, Pipe Bender

Compact—Fits in the Trunk of Your Car

**FULL 1000 WATTS** continuous duty, 115 Volts, A.C. 60 cycles, 9 amps. Powered by husky Briggs-Stratton engine with recoil starter. Engine and generator operate at 3600 R.P.M. for maximum efficiency at minimum weight. Both units are mounted on steel base, with heavy sheet metal belt guard. Generator is self-regulating, and is equipped with outlet box containing fuse and 2 A.C. convenience receptacles. Cost only 5c an hour to operate. Shipping wt. 100 lbs. (Regular price \$225). You save \$65.50. Now only, F.O.B. Chicago **159.50**

**ITEM #2008 2000 WATTS** 115 V. A.C. generator set, powered by husky, fast starting Briggs-Stratton engine. Mounted on portable steel carrying base for easy handling.—Just right for small cottage and cabins needing inexpensive 2000 Watts of electricity. Ship. Wt. 190 lbs. F.O.B. Chicago **295.00**

## MASTER & SLAVE

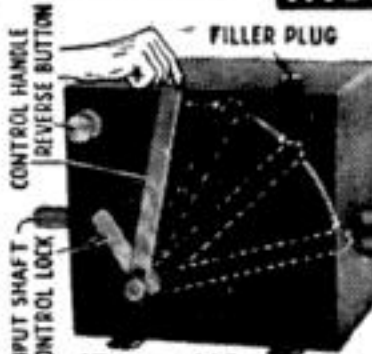
## HYDRAULIC REMOTE CONTROL SET



**Item #415**—Designed for remote operation of controls on engines, boats, special machinery, etc. Eliminates complicated mechanical linkages, cables, pulleys, etc. The master unit connects to the slave unit with a single  $\frac{1}{4}$ " tube. When master control lever is moved, slave lever follows exactly. Light, compact, aluminum alloy construction. Dim. of both units: 5 $\frac{1}{4}$ " W, 9" H, 1 $\frac{1}{4}$ " D. (exclusive of handle) Ship. Wt. 8 lbs. F.O.B. Chicago.. **27.50** pair (Note—tubing not supplied)

## GROBAN

## HYDRAULIC SPEED REDUCER



With **FINGERTIP CONTROL**

**USE FOR:** • Reamer Drives • Midget Cars • Feed Mills • Canning Machines • Conveyors • Lathes • Milling Machines • Motor Boats • Cream Separators • Garden Tractors • Pumps.

Variable output speeds from 0 to input speed available by moving control handle. Locking handle maintains setting. Use input power of  $\frac{1}{4}$  to  $1\frac{1}{2}$  H.P. Shafts  $\frac{1}{2}$ " diam. Input rotation counter-clockwise facing shaft. Input speed 750 R.P.M.  $7\frac{1}{2}$ " x  $7\frac{1}{2}$ " x  $11\frac{1}{2}$ " Output **54.50**

**ITEM #115** rotation reversible. Ship. wt. 31 lbs. Complete with 2 qts. of oil and full instructions. F.O.B. Chicago.

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**FREE! — NEW CATALOG**  
1956 EDITION, 56 PAGES.  
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Equipment Bargains for farm,  
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## BELT DRIVEN A. C. GENERATORS

ITEM  
#700



Ideal for powering electric tools, oil burner, refrigerator, lights, or other appliances requiring up to 700 watts of power. **700 WATTS**, 115 Volts, 60 cycles A.C. 3600 R.P.M. Compact, self-regulating generator with V Belt pulley and double outlet receptacle. Rotation counter-clockwise. May be driven by tractor or auxiliary gasoline engine. Requires 2 HP minimum. Dimensions: 10" long x 8" high x 6" wide. Shipping wt. 27 lbs. F.O.B. Chicago **59.50**

**Model 1010, 1000 WATTS**  
Same as above. **79.50**  
F.O.B. Chicago.....

## 300 AMP. D. C. GENERATORS

IDEAL FOR WELDING GENERATOR

ITEM #91

Type R-1, rated 300 Amps.—30 Volts, Mfd. by Jack & Heintz, Government Acquisition Cost \$380.00. Ship. wt. 55 lbs. Dimensions: 16"x10"x7". Complete with instructions to connect as Welder. F.O.B. Chicago **35.00**

## DOUBLE ACTION

## HYDRAULIC CYLINDERS

**ITEM #31C**— $3\frac{1}{2}$ " bore, 11" stroke. Alloy steel cylinder wall. Micro-Honed and all steel  $1\frac{1}{8}$ " diameter piston rod. 19 $\frac{1}{2}$ " overall length closed. Clevis mounting at base and shaft. Will lift 9625 lbs. with 1000 PSI Pump Pressure. Uses  $\frac{3}{8}$ " tubing fittings. (Fittings to pipe thread: two  $\frac{3}{4}$ " MPT @ 35c.) A \$102.00



value. Shipping weight **25.00**  
11 lbs. FOB Chicago..

**ITEM #16-C**— $1\frac{1}{2}$ " bore, 28" stroke. Will lift 1760 lbs. with 1000 lbs. pump pressure. Great for hay loaders, etc. 1" stainless steel piston rod. Postpaid. **16.95**

**ITEM No. 33C**— $1\frac{1}{2}$ " bore, 4 $\frac{1}{2}$ " stroke, alloy steel barrel, aluminum alloy ends, clevis mounting at both ends, lifting capacity 1760 lbs. in approximately  $\frac{1}{2}$  second using 1000 P.S.I., overall length closed 15 $\frac{1}{2}$ ", has 2— $\frac{1}{4}$ " pipe thread ports. Postpaid. **4.95**

## BERRY—HEAVY DUTY

## HYDRAULIC PUMP or MOTOR

**ITEM #166**—Use on road machinery, vibrators, paper mills, wire reels, hydraulic presses, speed control units. Ball bearing construction, balanced cam design assures high efficiency performance. When used as a pump: delivers 8 G.P.M., 1000 P.S.I., 8 H.P. At 1200 R.P.M. as a HYDRAULIC MOTOR: Rated up to 12 H.P., up to 2400 R. P. M. Standard  $\frac{3}{4}$ " pipe thread ports.  $\frac{3}{4}$ " shaft with keyway. Dimensions: 14 $\frac{1}{2}$ "x8"x7". Weight 63 lbs. Regularly \$212.00. **OUR SPECIAL PRICE...ea. 59.50** F.O.B. Chicago 2 for 110.00



## KAKEST MORTAR PLANE

"Amazing New Mason's Tool"

Makes it easy for amateurs to build masonry block walls. Lays smooth ribbon of mortar. Saves time and money. No waste of mortar. Send for FREE Folder.

**KAKEST COMPANY** Dept. 3  
Curwensville, Penna.



**\$13.95**  
Money Back  
Guarantee

## Cleans hard-caked brushes

ACTS INSTANTLY — no long soaking. Leaves bristles like new. At paint and hardware stores.

## IMPERIAL Rapid Brush Cleaner

Wilson-Imperial Co., 121 Chestnut St., Newark 5, N. J.



MAY 1956 251



## Bernz-O-Matic Instant-lighting "Packaged" Propane Torch MAKES IT EASY

### Patch gutter leaks in 15 minutes



Simply wire brush or sand around the hole. Apply flux. Clean and flux underside of copper patch. Tin both patch and gutter by heating solder with Bernz-O-Matic® Torch. Then place patch over hole and heat with torch until it sweats on.

### Antique a chair in 20 minutes

First, burn off existing paint with Bernz-O-Matic Torch. Carefully sand. Then go over piece slowly with torch with low flame. Move flame with grain and in circles to make knots. Then cover with clear shellac.



### Repair jewelry in 5 minutes



Place TX-400, small soldering accessory tip on TX-10 Torch and "tin." Clean area where metal is to be joined with emery cloth. Use acid and solder with Bernz tip providing heat that "flows" solder between joints.



**NOW SAVE \$3.41!**  
**GET A BERNZ-O-MATIC® TX-80  
UTILITY TORCH KIT**

This low-priced, big value Propane Torch Kit, a \$10.90 value only \$7.49

Includes Bernz-O-Matic Torch with pencil-burner head, plus utility burner head, plus soldering tip attachment and a box of Kester solder—a regular \$10.90 value, now only \$7.49 at your hardware dealer's today. Torch alone only \$6.95.

Jobs illustrated and others are in the Bernz-O-Matic "Do-it-yourself" book. To get your free copy write:

**OTTO BERNZ CO., INC.**

770-5 DRIVING PARK AVENUE • ROCHESTER 13, NEW YORK

## 40,000-Mile 'Road to Everywhere'

[Continued from page 250]

Civil Engineers picked the Seven Modern Civil Engineering Wonders of the U.S.: The Chicago Sewage Disposal System (which included reversing the Chicago River), the Colorado River Aqueduct (which brought water to six million people), the Empire State Building, the Grand Coulee dam, Hoover dam, the San Francisco-Oakland Bay Bridge, and the Panama Canal (built by the U.S.).

**Eighth wonder?** The Interstate System will make all of these look like something a small boy put together out of building blocks or in a sand pile.

For one thing, it will cost 27 billion dollars. That's more than the tax assessor thinks every single building, home and scrap of real estate in all New York City is worth. The Panama Canal, greatest earth-moving project of its time, cost only \$633 million.

For another thing, construction of the Interstate will set off the biggest bridge-building spree the U.S. has ever been on. Thousands must be built, replaced or strengthened. Most will be small. But the proposed world's largest suspension bridge—over the Narrows, New York City's harbor entrance—may be erected as part of the Interstate.

In fact, it would have been impossible for even the U.S. to have built the Interstate at the rate planned before now.

**Men and materials.** Only today can we hope to get enough road engineers and enough experienced workers. For the first time, we're manufacturing enough concrete to make the job possible. And enough steel, too. Although, Royall observes, it will still be hard to get steel as the job moves ahead. Only today do we have the massive earth-moving and other road-building machinery, much of it developed during World War II and improved since.

The Interstate will keep busy all the heavy equipment we have—plus all that we can possibly build new—and all our qualified manpower for 10 years. Some engineers say 15 at least. (These esti-

[Continued on page 254]



# SO EASY TO USE...



**Model 900**  
Heavy duty. Out-sands, outlasts others. Exclusive "No jump", Multi-Motion sanding action. **\$39.95**

**Model 504**  
Light. Powerful. Easiest for vertical use. America's greatest finish sander. **\$19.95**



**SO POWERFUL ...  
SO DURABLE!**

*and*



**SYNCRO SANDERS Feature the Modern Syncro Reciprocating**

**MOTOR** ... today's greatest achievement of all electro-mechanical research! Powerful! Smooth! No cams, belts or gears. No rotating parts to wear out. No brushes to burn out. See sanders at stores. Write Syncro for Free catalog and sanding handbook.

MULTI-MOTION  
**SYNCRO**  
SANDERS

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Dept. 2-56  
OXFORD, MICHIGAN, U. S. A.

**WORLD'S LARGEST MANUFACTURER OF  
RECIPROCATING MOTORS**

A perfect paint job with half the trouble. Get your money's worth. Paint shaken on a Red Devil Paint Conditioner is ready to use right out of the can. Paint is perfectly mixed factory-fresh — needs no stirring. Ask your dealer to mix your paint on a

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How to Prepare Surfaces for Finishing. Illustrated instructions on preparing masonry, wood and metal surfaces for painting.

**Red Devil Tools. Dept. 124**

2400 Vauxhall Road, Union, N. J., U. S. A.

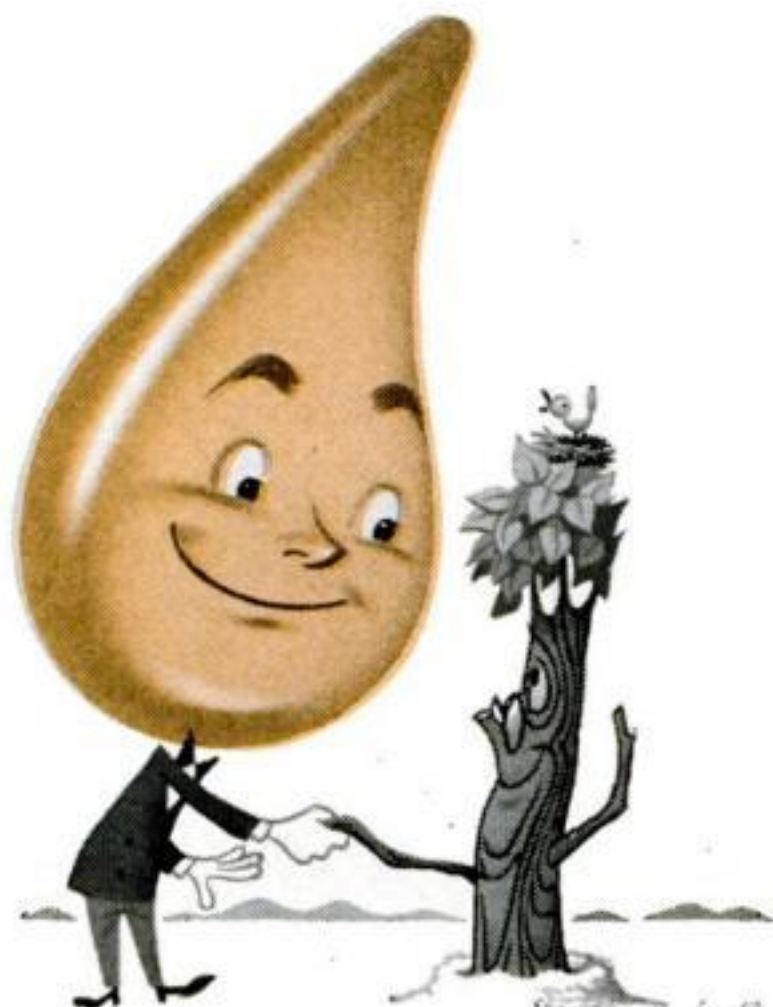
Please send FREE copy of "HOW TO PREPARE SURFACES FOR FINISHING."

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1662



Pete Penn says:

# "Mother Nature...

stored her finest crude oil beneath the hills of the Pennsylvania Grade oil regions, where I come from."

That's why today's best motor oils are brands of Pennsylvania. No other motor oils are so *naturally* suited to the high-speed, high-temperature service of today's engines.

Take a tip from Pete Penn. At your *next* oil change, ask for a brand of Pennsylvania motor oil. Sold by good dealers everywhere.

**Today's BEST Oils**

**Start with Nature's Best Crude  
...and that means Pennsylvania!**

INSIST ON A BRAND OF



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PENNSYLVANIA GRADE CRUDE OIL ASSOCIATION, Oil City, Penna.

**PENNSYLVANIA**  
Motor Oil

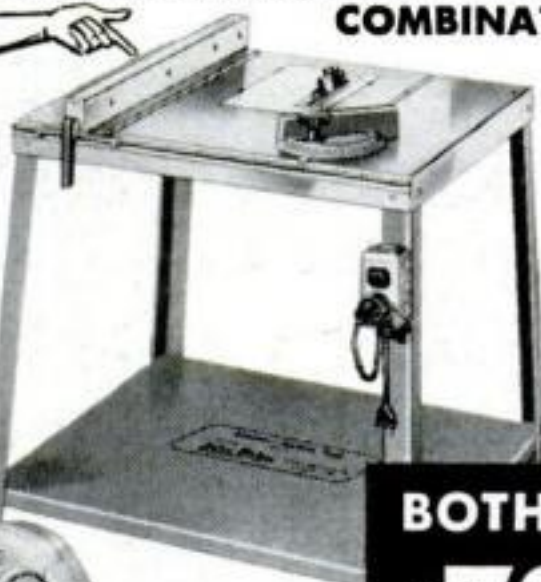


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### MAXAW and SAW TABLE COMBINATION



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Cam Lock  
Rip Fence  
•  
Precision  
Miter Gauge  
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Built-in  
Off-On  
Switch

**BOTH FOR  
\$79.90**

Regular Price  
\$89.90

Slightly higher in Canada

**MAKES ALL CUTS  
IN 2" DRESSED LUMBER**

## BIG BONUS BUY FOR THE DO-IT GUY

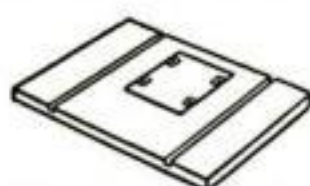
A saw table one minute, a portable saw the next! Both for what you'd expect to pay for the saw alone. Now! Get real professional results on all building and home improvement jobs. \$49.95 MAXAW plus \$39.95 saw table at special \$10.00 savings. Act now! Offer expires June 30, 1956.

### MAXAW 777 SAW TABLE

Rugged, all-steel; oversize top, 24" x 20". 34" height. New Cam Lock rip fence and 7" calibrated miter gauge operate from either side of saw blade.

### MAXAW 717 POWER SAW

Famous magic pivot gives MAXAW deeper cuts—1 7/8" at 45°, 2 1/8" at 90°—with 6 3/4" blade. Hardened steel gears: snap-back telescope guard. Lighter, easier to handle.



Saw shoe slips flush into table in seconds.



Same cutting capacity as 8-in. Table Saw.



True-Course Guide\* automatically guides saw, prevents wood bind. \*Patent Applied For



Rip Fence Guide FREE. Regular \$2 value.

In Canada: 334 Lauder Ave., Toronto 10, Ontario

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**Get  
FREE  
Power  
Tools  
Book**

**John Oster**

MANUFACTURING CO.  
Dept. CP3, 5055 N. Lydell  
Milwaukee 17, Wis.

Please send full-color booklet showing 64 ways to use power tools.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

## 40,000-Mile 'Road to Everywhere'

*[Continued from page 252]*

mates assume that Federal aid will hurry things along.)

Once the Interstate is finished, "we'll have," says Royall, "a road system for 100 million vehicles." It will not be finished a moment too soon, because that may be the number of cars we'll be driving 10 to 15 years from now.

In full operation, the Interstate, which will total 1.2 percent of the nation's highway mileage, will carry at least 20 percent, planners think, of all miles traveled by those 100 million autos, trucks and buses.

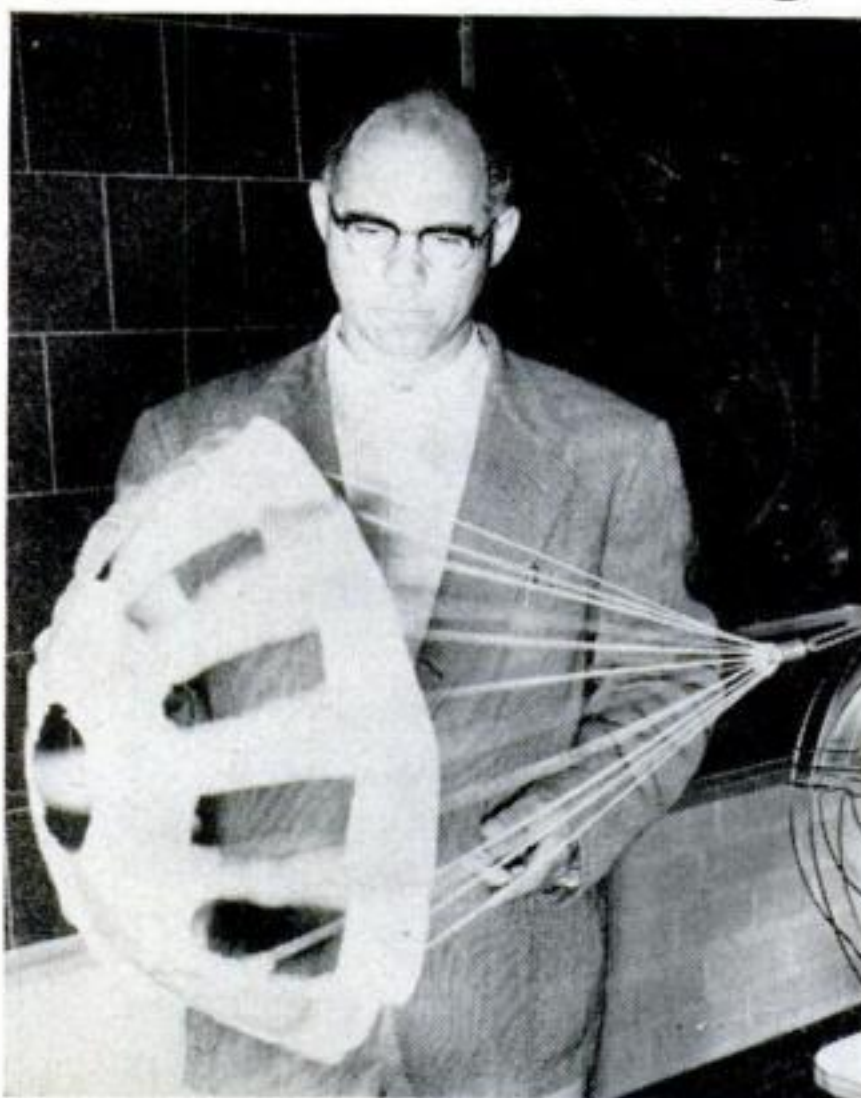
And then? There is, says Royall, one thing he can predict with certainty about the future of the Interstate:

"We'll have to add to it."

END

**NEXT MONTH:** How electronic brains are breaking up our traffic jams.

## Spin Increases Chute's Drag



AN ELECTRIC-FAN breeze and this tiny model show how the new "Rotafoil" spins on its swiveled harness. Rotation flares the parachute's edges, increasing drag and stability. The fabric windmill was developed by the Radioplane Company of Van Nuys, Calif., to soften the fall of heavy cargo and munitions.



# SUPREME Versamatic

## REVERSIBLE SCREW DRIVER AND SPEED REDUCER



fits all  
power  
drills

**First time ever! It REVERSES!**



Drive and remove screws with Supreme Versamatic. Versamatic reduces speed 7 to 1, increases power 7-fold. Reverses with one twist. Handles even the largest screws with ease. Also for nut running (adapter furnished); tapping; and all heavy duty drilling where speed reduction is needed. Fingertip control means safe, fast work. Complete set \$14.95.

(1/2" chuck extra). At better hardware stores.

SUPREME PRODUCTS, Inc., 2222 S. Calumet, Chicago 16

## CAR BURNING OIL?

Oil consumption reduced, compression improved by this simple treatment which forms self-lubricating seal at piston top. Gives new car performance up to 10,000 miles. Installed through spark plug holes. **\$4.95** tube, most cars.

Prices in Canada  
Slightly Higher

**HOLT'S Piston Seal**

Cylinder  
Compound

See Your Neighborhood Auto Accessory and Parts  
Replacement Store, or Write for Full Details

**TREGLOWN CO., INC., FANWOOD 76, N. J.**  
CANADA: Treglown, Ltd., 1366 Greene Ave., Montreal 6

## WELD IT YOURSELF! IN A JIFFY!

**Weld, Cut, Braze, Solder  
IRON, STEEL, BRONZE, BRASS,  
ALUMINUM & OTHER METALS**

Tool and Equipment breakdowns are always annoying and costly. Don't let them bother you. Get a Dynamic Arc Welder. You can do expert work on your very first job. Welders operate from any properly wired 110 V. AC line. Also make your own wrought iron furniture, railings, fences & knick-knacks. Repair fenders, & bodies etc. with the handiest "tool" in your workshop. A Dynamic will pay for its low cost of \$38.50 F.O.B. in both time and money.

**DYNAMIC INDUSTRIAL type  
transformer Arc Welder**  
75 amp. output for Industrial  
or Workshop use.

**DYNAMIC  
WELDER CO.**

Dept. D3-E, 1808 S. Federal St.  
Chicago 16, Ill.

### EASY PAY PLAN

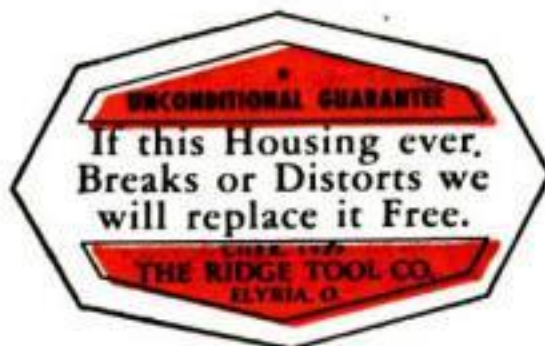
Low down payment. Pay as you weld. Sold on money-back guarantee. Send for details. Complete outfit only

**\$38.50**

f.o.b. factory



**Free Details and "How to Weld"**

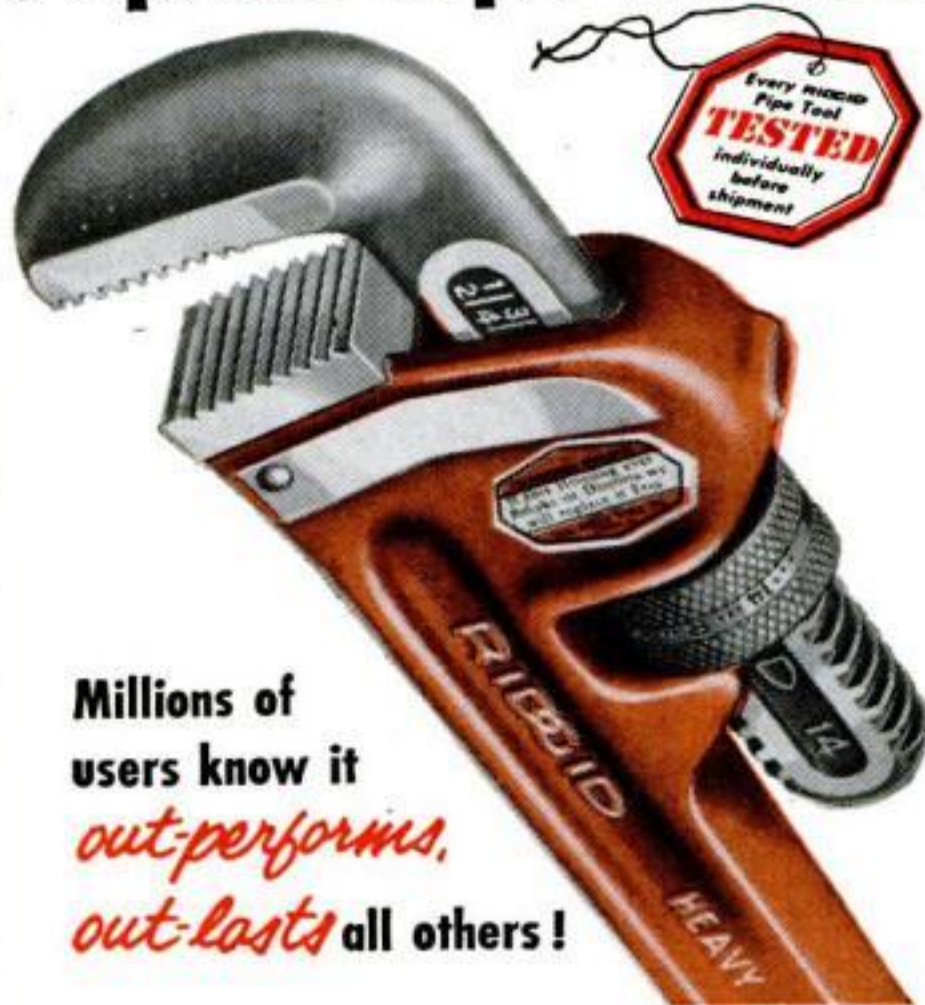


Even  
*without*  
this  
famous  
guarantee

*Genuine*  
**RIDGID**

would still be

**the World's Most  
Popular Pipe Wrench**



Millions of  
users know it  
*out-performs,*  
*out-lasts* all others!

It's the "RIDGID" name that guarantees you everything you want in a pipe wrench—instant bite on the pipe or conduit, instant let-go—it can't lock because of patented hookjaw suspension . . . handy pipe scale, easy-spin adjusting nut, comfort-grip I-beam handle . . . and every one factory-tested before shipment! For your work, for your home, it's most for your money—buy it at your Hardware Store!



The Ridge Tool Company, Elyria, Ohio, U.S.A.



# "We made our home 15° cooler in summertime



## with Gold Bond TWINSULATION®

"'Twinsulating' our attic gave us our first comfortable summer. And the job took just a few hours. We simply tucked the blankets between the rafters, from the floor up to and between the crossbeams, stapling as we went.

"TWINSULATION not only keeps our home cool in summer; it cuts winter fuel bills up to 25%. It's called TWINSULATION for its twin-insulating action. It *blocks* heat with fireproof rock wool, *reflects* heat with a covering of silvery aluminum all around."

"Twinsulate" your attic—before summer. See your Gold Bond dealer. He'll show you samples and supply a stapler for application.

**NATIONAL GYPSUM COMPANY**  
Buffalo 2, N. Y.



Send for booklet that tells all about Gold Bond TWINSULATION . . . what it does for your home, how it cuts fuel bills.



NATIONAL GYPSUM COMPANY  
Dept. PS 56, Buffalo 2, N. Y.

I enclose 10¢ for "Home Insulation" booklet.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ County \_\_\_\_\_ State \_\_\_\_\_

## How They've Laid Wires to Europe

[Continued from page 136]

transatlantic phone takes to air, via 19 microwave radio stations erected by Bell System engineers, to Portland, Me.)

Route and terminals agreed upon, manufacturing the 3,500 miles of deep-sea cable and the 900 miles of extra-heavy armor shallow-sea cable became the immediate task. The cables had to be made beside the sea so that they could flow via rollers from the factory into the wells of the cable ship. A British firm built a new factory on the Thames to make the deep-sea cable. Simplex Wire & Cable Co. contracted to produce some heavily armored cable at their Newington, N. H., plant. Western Electric, the Bell System manufacturing unit, built a factory at Hillside, N. J., to make the 102 deep-sea repeaters, each a \$70,000 item requiring a year to assemble.

*The finished repeaters*, gently packed in aluminum cases, were trucked—at 10 miles per hour—to Newington, where they were armored and equipped with 28-foot stubs of cable. From the Simplex plant they were flown in special rigid cases, equipped with "bump meters," to England to be spliced every 40 miles into the cable. At this point they became mere bulges in the coiled cable, brightly painted as a warning to the *Monarch's* skipper to slow down from six to three knots as each repeater rolled over the drums and into the sea.

Though the *Monarch's* crew had laid thousands of miles of cable, this life-line across the Atlantic called for new and more precise techniques. So, early in 1955, the *Monarch* steamed to Gibraltar, where 200 practice miles of the new cable were laid, first in the shallow Bay of Cadiz, then in deep ocean off Casablanca.

Not a single repeater was damaged during this test-laying operation. But it was clearly demonstrated that letting up on the tension meant kinks in the cable; that once the *Monarch* started across the Atlantic she would have to keep steaming steadily, come high winds or high

[Continued on page 278]



## RUBBER HOSE

Genuine Neoprene Hose—outlasts ordinary rubber 3 to 1. Reinforced with super tough cotton cord plies—yet completely flexible. Equipped with standard thread male and female fittings. Pump water for irrigation, stock tanks, home, barn, fire fighting, etc.—or pump gas and fuel oil. Volume factory prices—save more than 60%.

**TERRIFIC VALUES!**

| Inside Dia.        | Length  | Price |
|--------------------|---------|-------|
| 1 1/4"             | 10 ft.  | 5.95  |
| 1 1/4"             | 25 ft.  | 13.95 |
| 1 1/4"             | 50 ft.  | 24.75 |
| 1 1/4"             | 100 ft. | 49.95 |
| 1 1/2"             | 10 ft.  | 10.95 |
| 1 1/2"             | 25 ft.  | 14.75 |
| 2"                 | 10 ft.  | 16.50 |
| 2"                 | 10 ft.  | 9.50  |
| 2" (no cord plies) | 10 ft.  | 21.50 |
| 2" (suction)       | 10 ft.  | 21.75 |
| 2 1/2" (discharge) | 10 ft.  | 25.50 |

**1/2" I. D. HIGH PRESSURE STEAM HOSE** per ft. **\$1.00**  
**AIR HOSE** Heavy duty, 1/4" I. D., 2 plies (150 lb. pressure) with standard couplings, 20 ft. lengths, ea. **\$2.95**  
**PAINT SPRAY MATERIAL HOSE** 3/4" I. D. Synthetic Thiekol inert tube and neoprene cover—finest model! 25 ft. lengths with standard couplings, (Item 62) each **\$7.50**



## HEAVY DUTY D-C ARC WELDER

Use as portable or shop welder. Up to 300 amps. Senior model. Made for years of trouble-free, continuous service. Will handle light or heavy jobs. Easily welds up to 3/4" plate using 1/4" rods. Built-in air cooling system. Arc is easy to strike and hold, because of specially designed arc stabilizer. Hi-lo switch and dial control gives wide range of welding heats. Run welder at 2600 rpm. with tractor, jeep or 15 hp. gas engine, or 7 hp. elec. motor. Complete with instructions, guar. and triple V belt or flat pulley. Easy to hook up and easy to operate. Wt. 110 lbs. \$400 value. **\$119.50**

**WELDING KIT** two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at. **\$10.50**

**SAVE**

middleman profits...  
get **MASTER MECHANIC'S**  
bedrock factory prices

(Item 24)



## 600-700 WATT PLANT

**PUSH  
BUTTON  
START**

115 v. 60 cyc. AC Powered by a rugged 2 HP. easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. **\$143.50**  
**1000-1200 Watt Plant** (Item 45) same as Item 24 but larger generator and engine with 50% greater output. **\$199.50**

## 9 TON HYDRAULIC PRESS

A tremendously powerful hydraulic press, capable of exerting 18,000 lbs. pressure. Pays for itself many times over—straightening bent connecting rods, king pins, crankshafts, axles, link pins and bars—or pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvils and jigs to straighten any kind of curve or bend. (Item 464) Wt. 110 lb. Actual list price \$365. Our special close-out price... **\$69.50**



## 2-Speed Aluminum Alloy WINCH

sturdy high speed ball bearing winch—super tough aluminum alloy construction (weighs only 60 lbs.), rugged yet portable! Two speeds, (first) thru gears for easy handling of heavy loads, (second) direct drive for fast take up. Built-in drum brake with ratchet hand lever, enables operator to ease loads down gently and lock at any point desired. Large crank handle gives extra leverage—has non-slip, two handed revolving grip. Rated at 3000 lbs. lifting capacity. Drum handles 400 ft. of 3/8" cable or 600 ft. of 1/4" cable. Ideal for contractors, farmers, boat operators—mounting on trucks, tractors, farm implement trailers, etc. Easily converted for power operation. (Item 794) \$200.00 value—only... **\$49.50**

## EXTENSION CORD

Heavy duty and very flexible. Neoprene 14-2 cable. 20 year quality. Wt. 12 lbs. (Item 185) 100 ft. Complete with rubber plug and outlet. A terrific buy at only **\$8.95**

## JET STEAM MASTER

Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. off implements and road machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk equipment, etc. Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it; built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. **\$329.50**  
 Special factory price.....



Send check or M.O. Prices f.o.b. Factory. 10 day Money back guarantee. SEND 10c for... **1956 B/G**  
**MASTER MECHANIC MFG. CO.,** DEPT. 55-M **Burlington, Wis.** **Catalog**

## YOU MUST READ THIS!

Before you pay out another **COSTLY PLUMBING BILL—**



How many times have you seen the clogged up **SINK**, the **FLOODED BASEMENT**, or the damage done by the overflow of the **TOILET** or **URINAL**? Then—I'm sure you remember the **Costly Plumbing Bill!** Now, do it yourself with our New **Rodding Tool** which cleans out roots, grease rags up to 100 ft. Ideal for Home Owners, Apartments, and Factories.  
 But now I ask you—what is it worth to you when its cost is less than the bill your plumber sends! So hadn't you better Beat the High Cost of Plumbing Bills by writing us for **FREE BOOKLET** right now. Tear this ad out—while it's still before you—so we can have this money saving news off to you right-a-way! Obey that urge & write. No Salesman will call. Chicago phone Kildare 5-1702. A postcard will do.

**MILLER SEWER TOOLS**  
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Convert Lawn Mowers into Power Units with this **Briggs & Stratton GAS ENGINE**  
**2-H.P., 4-Cycle**  
**AIR COOLED FULLY GUARANTEED**

**SAVE! SPECIAL OFFER \$37.50**  
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**Powers Farm, Home & Industrial Tools**  
 • Garden Equipment • Pumps • Compressors

## GOV'T SURPLUS

Briggs & Stratton leads the world in dependable, trouble-free performance. A precision-built 2-horsepower, 4-cycle engine with advance styling and economical operation. Easy rope start—sure fire ignition in all weather. Positive, automatic splash-lubrication system. 2 Qt. gas tank. Float feed carburetor with adjustable idle speed and automatic governor. Oil bath air cleaner. Complete with muffler. 3 Piston rings for added compression. 2000-3600 RPM adjustable speed range.

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A big, fact-packed catalog full of pictures and tool information... yours for the asking.

- Snap-on tools help you handle repair jobs faster, easier, better.
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- Used and endorsed by America's top-earning mechanics in all fields.
- Start building your Snap-on set with basic units... add other tools any time.

**Snap-on Tools**  
 THE CHOICE OF BETTER MECHANICS

MAY 1956 257



# NEW PRE-PASTED

## Bolta-Wall

### WASHABLE VINYL TILE



**"Just wet the back!"  
Goes up Easy!  
Cleans Easy!**

Beautiful, washable Bolta-Wall vinyl tile is stain and scuff resistant... the perfect worry-free wall covering for all the busy areas in your home. The pre-pasted adhesive backing makes it "postage-stamp-easy" to install... no messy pastes, just wet the back and stick it on!

Bolta-Wall tile is available in rich Mahogany or Bamboo patterns, both in colors that work beautifully with all decors.

Redecorate this easy low cost way... ask your flooring or building supply dealer for Bolta-Wall pre-pasted vinyl tile.

**Send for samples  
and  
illustrated folder**



WET THE BACK



IN KITCHENS



IN LIVING ROOMS



IN REC. ROOMS



**The General Tire & Rubber Co.**  
BOLTA PRODUCTS Division, Lawrence, Mass.  
Send me complete information on low cost  
Bolta-Wall Pre-Pasted Vinyl Tile

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

PS-5



### Scooter Speeds Meter-Reading

THE three-wheeled motor vehicle above is being tested by the water department in Atlanta, Ga., as a means of easing weary feet. An employee rides up to a meter and reads it without dismounting. It's especially helpful in the spacious suburban areas.



### Prompter Aids Public Speakers

AN ELECTRIC device to give speakers at banquets, business meetings and the like the prompting that movie and TV actors get is now being produced by Underwood Corp., maker of business machines. Smaller than the professional model, it will fit in an attaché case. The speaker can control the speed of script moving across the viewer.





**NEW SIOUX**

### 1/4" DRILL KIT

Here's the powerful SIOUX 1/4" electric drill with accessories for sanding, drilling, grinding, sharpening, wire brushing, polishing, cleaning, etc., all in a handsome, fitted metal case that hangs on the wall or goes to the job... **\$41.75** Complete Drill only **\$24.95**



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**AMAZING, PERMANENT, NON-ELECTRIC. HIGHLY PRACTICAL.** Conduct interesting experiments. Hundreds of uses. Retrieve valuable steel items such as guns, tackle from fresh or salt water; tools from tanks & drains. **GUARANTEED.** Try any magnet one week. Money back if you are not well-pleased.

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| No. S-710 Has pull of 225 lbs. on flat steel block..... | \$16.50       |
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| No. S-575 Has pull of 75 lbs. on flat steel block.....  | \$6.50        |
| No. S-500 Has pull of 50 lbs. on flat steel block.....  | \$4.50        |
| No. S-47 Hot Pad Magnets 10 for \$1.00.....             | 50 for \$4.87 |
| No. S-35 Hobbyist assortment of 8 small magnets.....    | \$1.50        |

Send M.O. or check. We pay postage. Sorry no C.O.D.'s.

**MIAMI MAGNET COMPANY, 3240 N. W. 27th Ave., Miami 42, Fla.**



*The Flatfish*

**THE LURE THAT NEVER GOOFS**

With its lifelike motion, its exclusive offset hooking and its quick-penetrating hooks, the Flatfish is always geared for action. It brings in the fish—and that's for sure! World's largest selling plug. Over 17,000,000 sold. Get it at your tackle dealer's. Write for 48-page book with fishing secrets of famous anglers.

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**4099 Beaufait Detroit 7, Mich.**

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*Feel the difference!*



- ✓ Easier starting
- ✓ More power
- ✓ Less gas consumption



## GUMOUT

- Cleans carburetors quickly and easily.
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- Add it to your gas tank regularly . . . or have your serviceman run it through your carburetor.
- Available at service stations, garages, auto supply stores, and hardware stores.



SEND FOR **FREE**  
46-page  
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FOR  
HUNDREDS  
OF RADIO, TV  
AND  
HOMECRAFT  
JOBS

SOLDER  
GUN ONLY —  
MODEL G14  
\$7.95

BEST KIT  
VALUE!  
MODEL G14K  
\$8.95

## Includes:

- ✓ 150-Watt Instant Solder Gun Model G14
- ✓ Cutting Tip for plastic tile, old putty, toys, etc.
- ✓ Smoothing Tip for furniture scratches, sealing, etc.
- ✓ Famous Kester TV-Radio Resin Core Solder
- ✓ Sandpaper for cleaning parts

"You'll like the way  
it HANDLES!"

COMBINES ALL THE ADVANTAGES OF THE SOLDER GUN AND THE CONVENTIONAL SOLDERING IRON. No waiting — press trigger and solder at once. Ideal tool for shop or home use. Takes only half the space of transformer guns in tool boxes.

120 Volts AC-DC 1/4" Tip  
(also available 5/16" Tip)

## COMPARE THESE FEATURES WITH ORDINARY SOLDER GUNS!

- POWER PACKED—150 Watts
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—weighs only 8 oz.
- STURDY LIFETIME TIP  
—no soft fragile wire
- HEAT RIGHT IN TIP  
—new unique element design
- LONGER, THINNER REACH  
—EFFECTIVE SPOTLITE

## HEXAACON ELECTRIC COMPANY

WEST CLAY AVENUE, ROSELLE PARK, NEW JERSEY

Serving Craftsmen for a Quarter of a Century

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GLAZE  
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Don't fritter away time and energy on temporary jobs. Use D-P Glazing Compound for ALL windows... wood or metal... for filling nail holes or cracks. Always ready, won't dry or harden in can. Fast, smooth, easy to apply. Just one of many fine D-P products. At all good stores... don't take substitutes!

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SHIFTING of loads that can cause damage in transit is minimized by dividing this new Unit Load boxcar into five sections. Fork-lift trucks can load or unload without maneuvering inside the compartments, each of which has an overhead door on either side.



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## mobile paint sprayer

**FREE!**

Write for  
"How to Spray"  
Booklet and  
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Choice of craftsmen for 35 years! Saves time, paint and money. Quickly gives flawless finish to walls, furniture, screens, fences and handiwork. Sprays all materials; 1/4 H.P. motor. Diaphragm principle assures clean, oil-free air. Never needs lubrication. With gun, less motor.  
**No. 890 Speedy Sprayer . . . \$38.50**

Add wheels with Wheel Kit No. 909.  
Includes 6" wheels, handle, fittings. **\$6.95**



At dealers everywhere

**W. R. BROWN CORPORATION**  
2637 N. NORMANDY AVE., CHICAGO 35, ILLINOIS

## Automatic Saw Set...

### MAKE EXTRA PROFITS!

Set 400 teeth per minute on hand or band saws, 4 to 16 point, with the BeMaCo Automatic Saw Set. Fast, accurate, true hammer-anvil action sets teeth uniformly, eliminates tooth breakage. Used profitably by saw shops and manufacturers everywhere. Every machine positively guaranteed!  
Write for details—today!

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800 ISIS AVENUE • INGLEWOOD, CALIF.

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Would you give a dollar and a half if you could use the slide rule and solve such problems as  $93.75 \times 1.28$  or  $20,196 \div 204$ —in a matter of seconds—WITHOUT PAPER AND PENCIL? Here's good news: The S-M SIMPLIFIED slide rule, created less than a year ago, is now used in every state in the U.S.A. Mass production makes possible the marketing of this ingenious instrument for **ONLY \$1.50**. The copyrighted S-M Slide Rule Book of Instructions, free with the purchase of the S-M slide rule, contains over 250 practical problems and answers. You can USE the S-M the first day. Guaranteed. Postpaid. Enclose check, cash or money order WITH COUPON. Sorry no COD's.  
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MILLERS FALLS  
**DYNO-MITE**  
1/4-inch electric drill  
No. 1814  
**\$25.70**



## Here's Power and Performance that's hard to beat

If you want power — plenty of power — then you'll like Millers Falls Dyno-Mite Electric Drills. They're light, compact, perfectly balanced — and they pack a punch that's way beyond their size.

You'll like the looks of these shining beauties, too — mirror polished to glistening silver sleekness. Most of all — you'll like the rugged quality that guarantees years of trouble-free service.

Illustrated is the 1/4" No. 1814 Drill, one of the complete line of Dyno-Mite 1/4", 3/8" and 1/2" drills. In addition, Millers Falls offers the broadest range of attachments and accessories available today—including the remarkable, high-speed Dyno-Mite Power Bits shown with drill above. See — try — buy them at your dealer's.



**Dyno-Mite Jig Saw Attachment** for 1/4" electric drills. Cuts straight lines, circles, any shape. Capacity: 1 3/4" in wood, 1/8" in metal. Comes with 4 blades. No. 2140..... **\$10.95**



**Buffing and Sanding Attachment.** Fits 1/4" electric drill. Complete with 5" Rubber Pad, two 5" Sanding Discs, and a 5" Lamb's Wool Bonnet. Two speeds. No. 2120..... **\$8.45**

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**FREE FOLDERS** on the complete line of Dyno-Mite Power Tools, including the amazing new Dyno-Mite Power Workshop. Ask for them at your dealer's or write:

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MAY 1956 261



now! assemble your own

## ALUMINUM SCREENS

save up to  
**50%**



LIFETIME PROTECTION—

YET IT'S ONLY MINUTES FROM PARTS TO FINISH WITH

## HOMESHIELD easy-to-make SCREEN KITS

**Make your work shop pay off!** Assemble these maintenance-free aluminum window screens for your home, cabin, or shop and save money...make 'em for neighbors, apartment houses or businesses, and make money! It's a simple assembly job that requires no special tools.

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**Kits are complete** with sturdy aluminum frames, easy-to-handle Fiberglas® screening, corner locks, installation hardware—even a miter box. Sizes for full screens and sliding half screens (and storm sash, too!) Ask your department store, hardware or lumber yard dealer, or mail coupon for folder and name of nearest Homeshield distributor.



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Street.....

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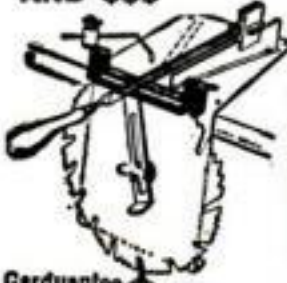
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Automatic controls **DEPTH—ANGLE—PITCH**

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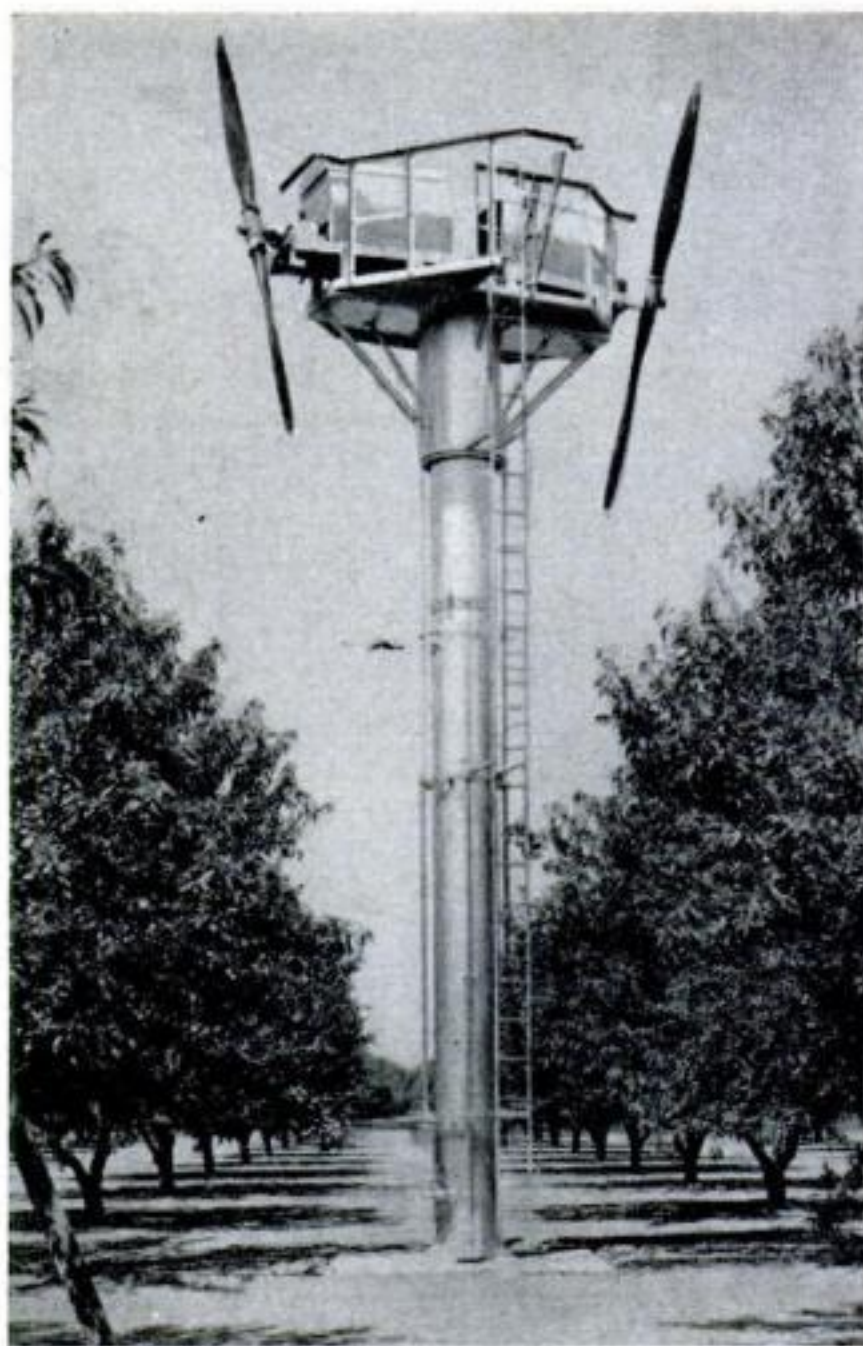


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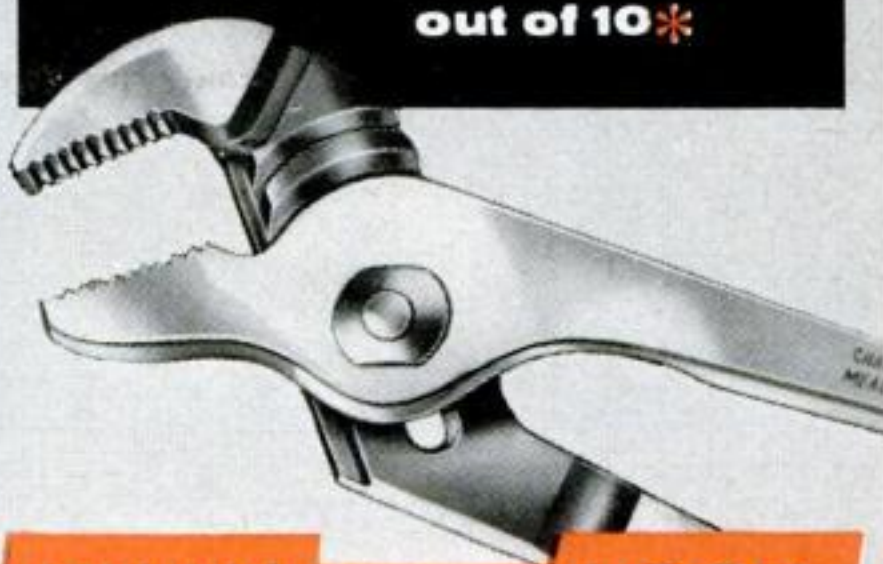


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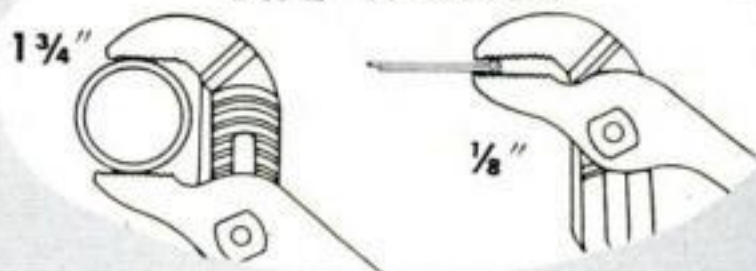


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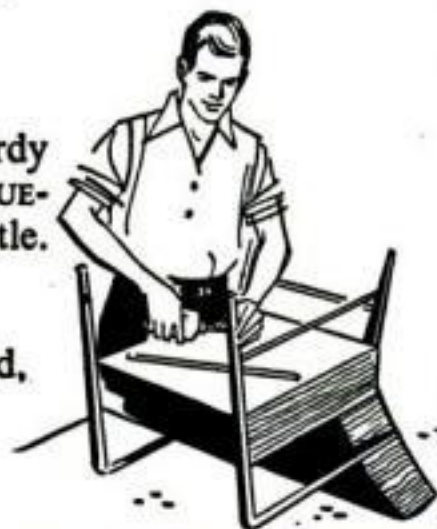
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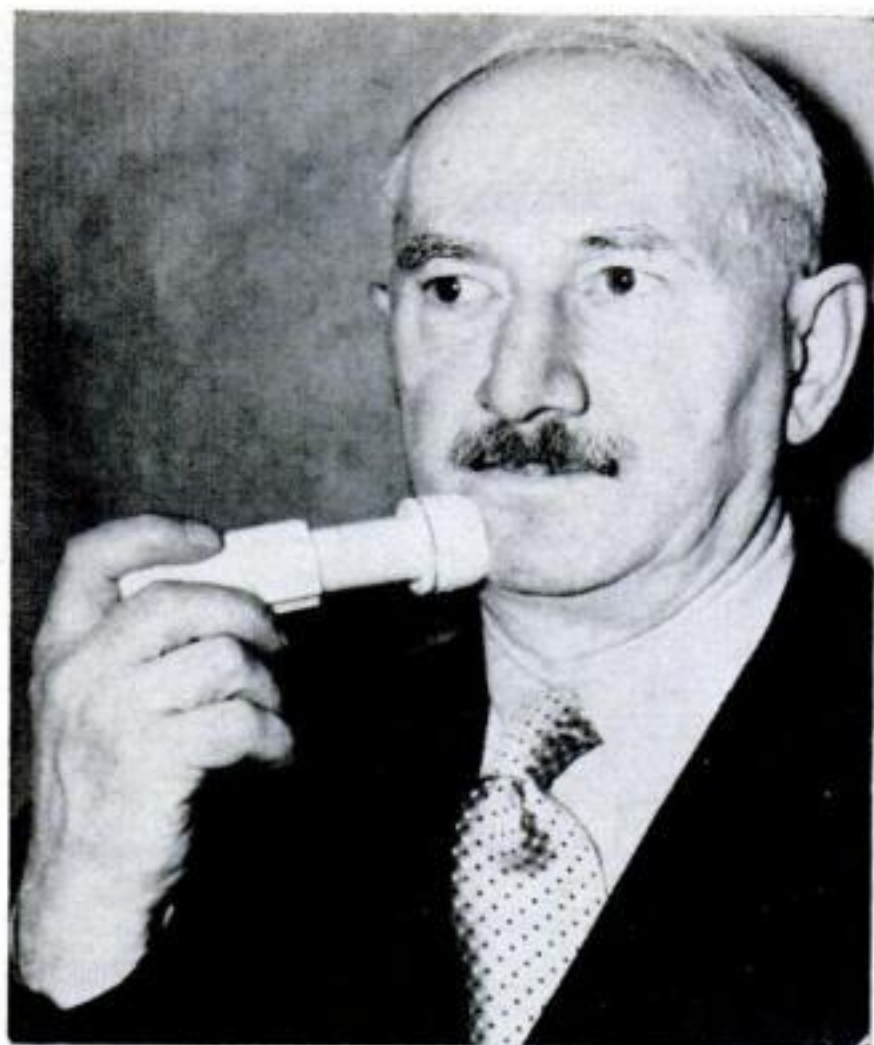
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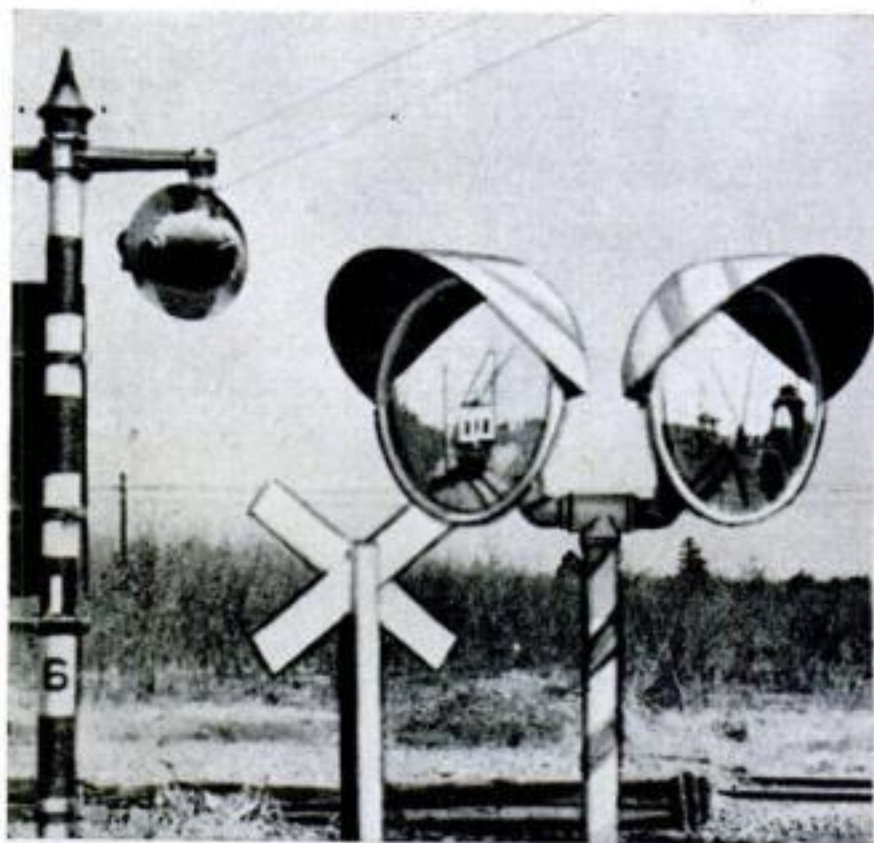
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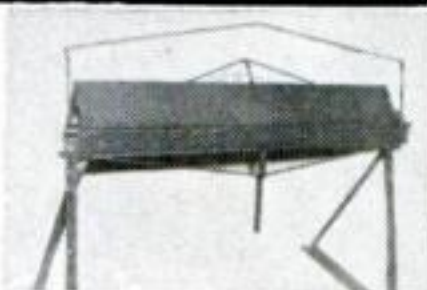
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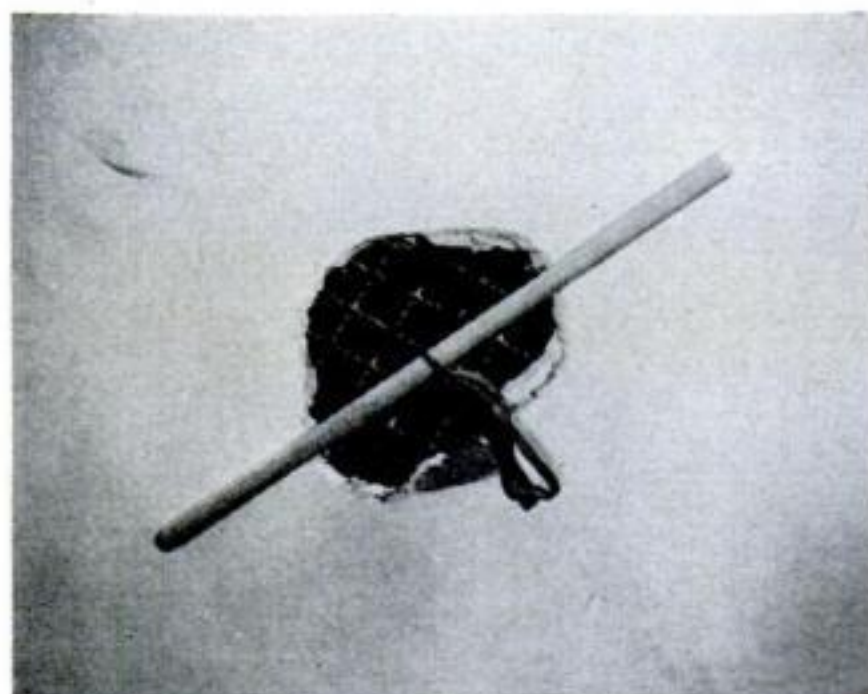
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EVER try to patch a hole in plasterboard? Without backing, wet plaster will fall through. But a piece of hardware cloth, cut so you can spring it through the hole, will give it the support it needs. Loop a rubber band through the mesh and slip it over a dowel to hold onto while you are troweling in the plaster.

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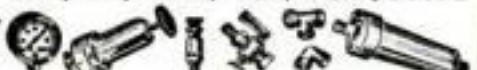
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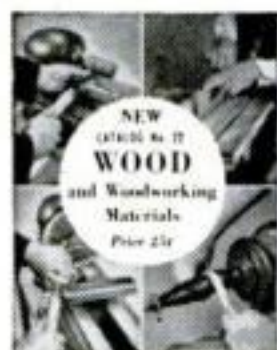
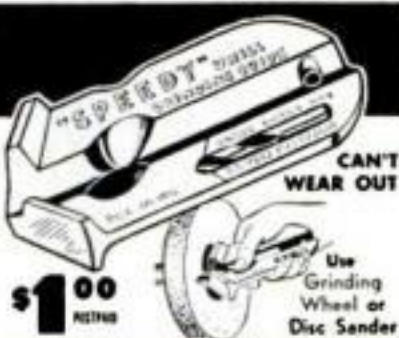
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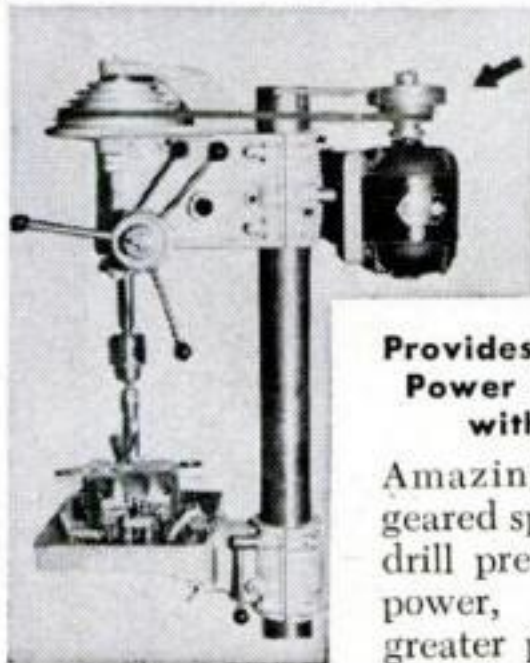


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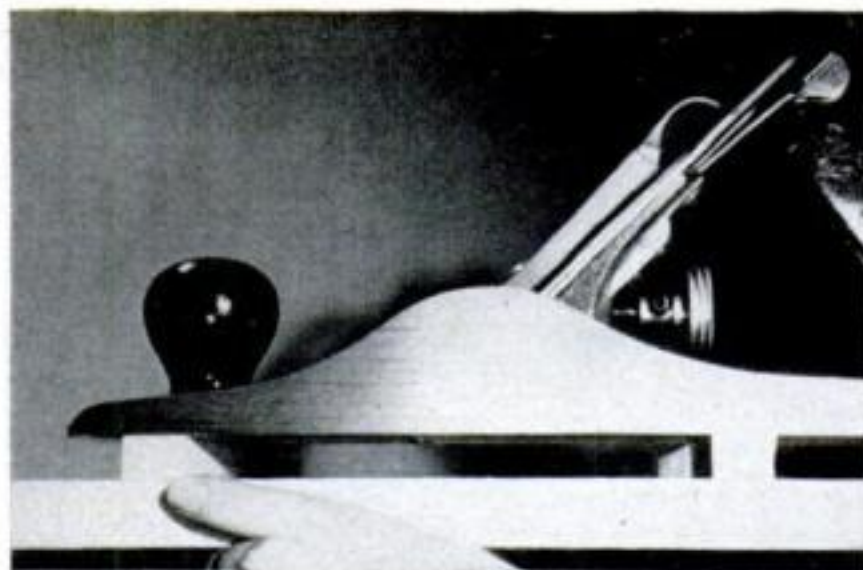
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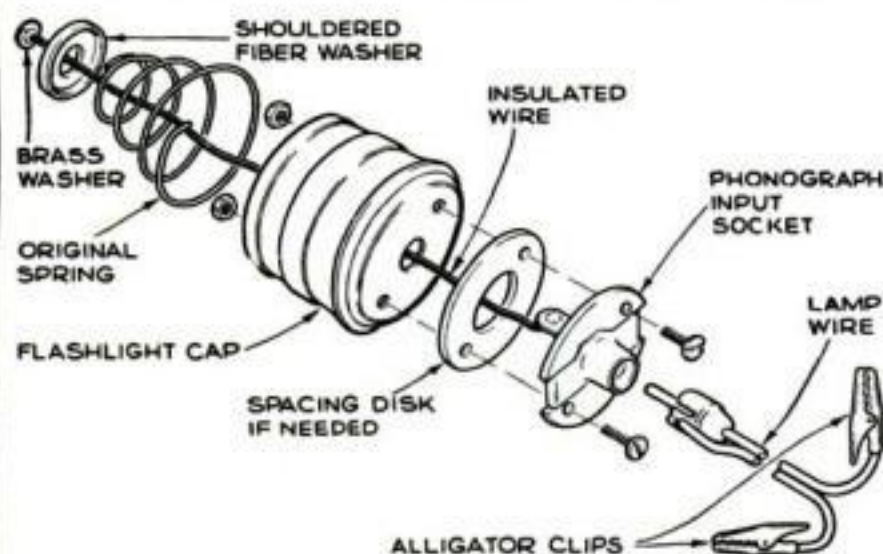
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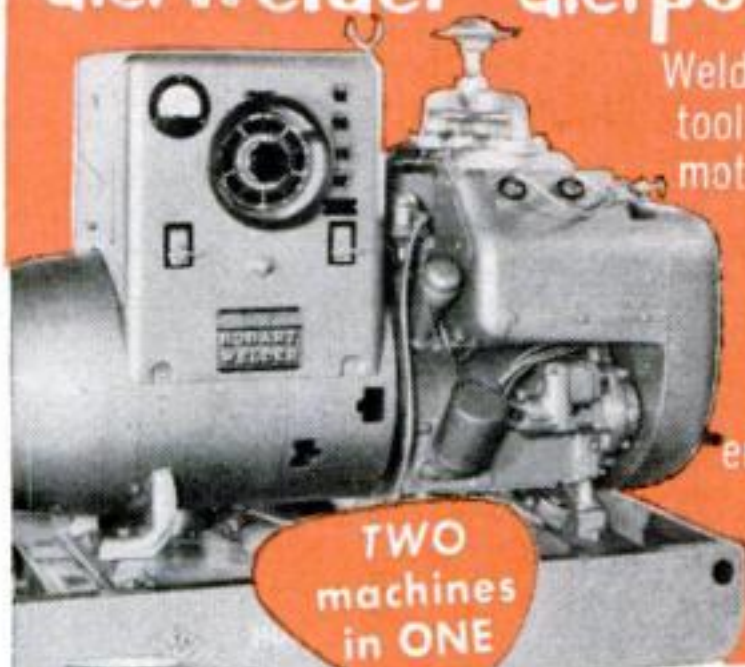
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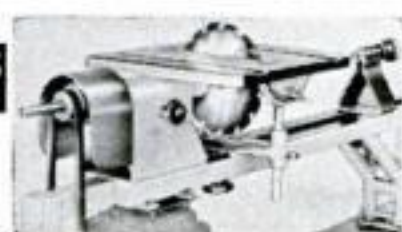
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## Eraser Computes Road Miles

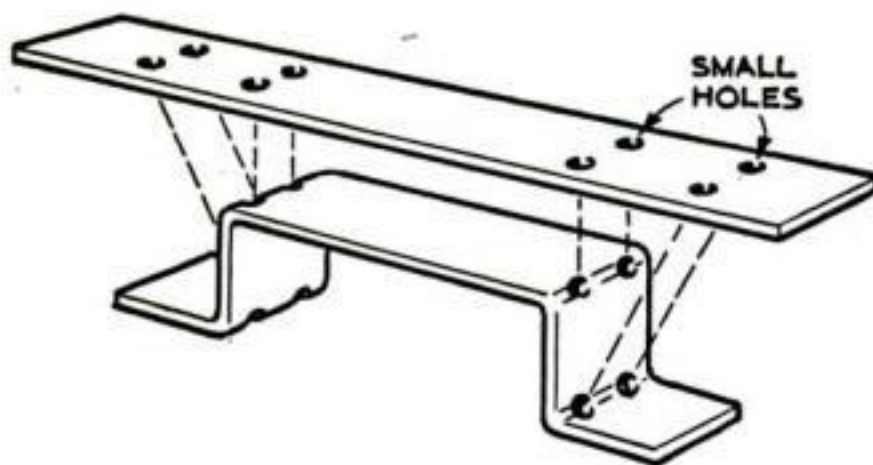
FIGURE road-map mileage easily by making a computer from a disk eraser. Using the map scale, mark off the rim in equal segments, each representing a mileage unit. Roll the eraser from point to point, and multiply the segments by the mileage unit.

## Lacquer Thinner Cleans Brush

You can unstick the bristles of a brush hardened by paint or lacquer by soaking it overnight in a jar of lacquer thinner. But be careful: The thinner is inflammable.

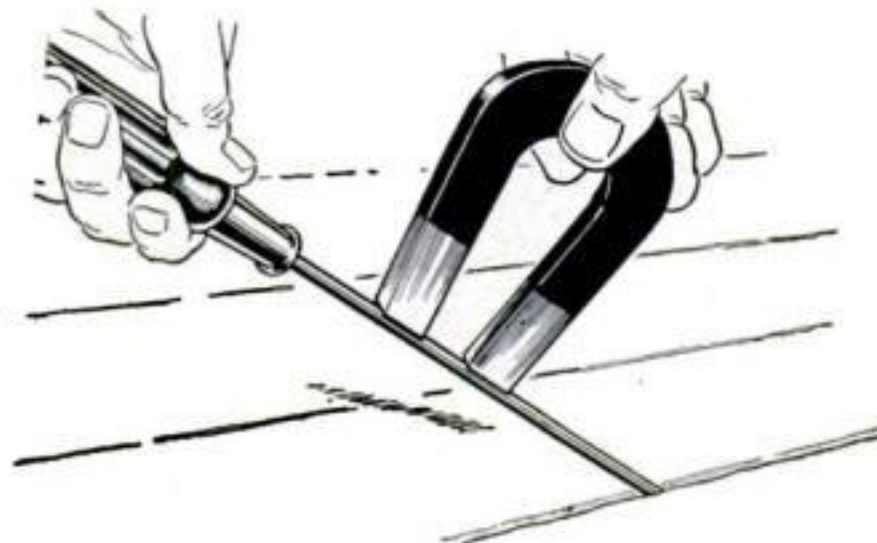
## Plastic Disk Placed in Ink-Bottle Cap Prevents Evaporation

BOTTLES of drawing and lettering ink have caps with paper liners that soon tear and become useless. To make sure that the ink will not evaporate, replace the paper liners with disks cut from thin sheet plastic.



## How to Bend Strap Iron

IF STRAP iron must be bent accurately and small holes are not objectionable, drill a series of holes on the bend lines, as in the sketch above. The iron will then bend across the holes—the weakest point.



## Screwdriver Becomes Retriever

TO RETRIEVE a small screw that had fallen into a deep crack, I put a magnet over the spot and slid a long, thin-shanked screwdriver down the magnet into the crack. The temporarily magnetized screwdriver picked up the screw.—K. M. Stead, Oradell, N.J.

## Sunglasses Are Painter's Aid

WHEN you do an outside painting job with white paint on a bright, sunny day, try wearing sunglasses. They reduce the reflected glare of the paint, make work safer.



## U.S. ARMY FIELD PHONE

A private phone or intercom system. Ideal for use on target range, farms, mountains, forest or any place where portable two-way communication is desired. This is the famous EE-8 field phone used to success by the Signal Corps. Gives clear reception up to 15 miles. Uses two standard batteries. Set consists of a ringing generator, one phone, all contained in the original handy carrying case. Several of these phones can be used on one line. Record. 1495

Price for a SYSTEM—two sets... 2950

## 133 PIECE POWER TOOL ACCESSORY SET—198

The complete accessory set for any small job. Can be used with any electric drill or grinder. Contains 133 pieces including grind, polish, cut-off & buffing wheels, sanding discs, steel cutters, mandrels, burnisher, mounted stones and knife edge rubber wheels.

## NEW 4-SPEED HOBBY MOTOR

Has four take-off shafts turning at 5, 25, 150 & 4000 RPM. Operates on 110 volt, 60 cycle current. Ideal for home shop, barbeque. 995

## REMODEL YOUR FURNITURE FOAM RUBBER—TODAY

FREE Catalog of our complete line...

## VICKERS BRASS 4-WAY VALVE

Will stand 2500 PSI. A heavy-duty valve with an ALL Brass body. Closed center, off in neutral. Ideal for use with any liquid. A \$200.00 Value... 3750

## VICKERS HYDRAULIC TRANSMISSION

Self-contained, constant torque at all speeds with variable volume, reversible piston pump which supplies piston hydraulic motor. Has 2 H.P. Automatic pressure dash pot for smooth control. Power output RPM—0 to 1/3 input RPM in both directions. Input RPM 1800 continuous, 4000 intermittent. Ideal for Lathes, Dupliator setup on Mills, Conveyors, Small Cars, Drives, etc. 4950

## 4" SPLINE SHAFTS for input and power take-off on above. Pair \$2.50

INPUT & TAKE-OFF PLATE ASSEM. To adapt Trans. to pulley drive. Has 1/2" keyway shaft. High Speed bearings. 2000 SET

## SURPLUS BARGAIN

No. 29 HYDRAULIC CYLINDER—Will give 20,000 pounds thrust using 1500 PSI line pressure as delivered from one of our hydraulic pumps. Gives up to 40,000 lbs. thrust with 3,000 PSI. Has a 4" bore and 18" stroke. Overall length 30 1/2 inches. USED 2995 NEW 4395

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Send for Special HYDRAULIC CATALOG SUPPLEMENT—Shows entire line of new Hydraulic Equipment designed especially to fill the needs of Industry. Also SAVE up to 85% on War Surplus Hydraulic Equip. including Pumps, Valves, Fittings, etc.

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## NYLON AUTO SAFETY BELTS

MADE TO WITHSTAND A CRASH LOAD OF 3000 POUNDS!!

Meets Civil Aeronautics Standards. Approved by Police, Safety Councils, Highway Patrol, Fleet Operators, etc. Made of finest NYLON webbing and fitted with Aircraft type buckle. Easily installed in any car. Special sizes for Sports Cars. Available in the following colors: Blue, Green, Gray and Maroon. Don't wait! You May Be Sorry!

995 VALUE ONLY 789 EACH SPECIFY COLOR AND ALTERNATE COLOR 3 SECONDS TO FASTEN—1 SECOND TO UNFASTEN

## PHILIPPINE MAHOGANY PLYWOOD

AT PRICES LESS THAN WHOLESALE

For Paneling Dens, Offices, etc. Use in Cabinets, Furniture, etc. Rotary Cut. Both sides sanded. Bonded with finest resin adhesive. Face side unjointed. Shipped at lowest rates.

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Use it to cover patio, for interior decor, as walls, partitions and many other uses. Ideal for the Home or Office & in new construction. Finest quality, many widths and lengths. Variety of colors. FREE Sample and Booklet. An 85¢ per sq. foot value... ONLY 49¢ SQ. FT.

## 3400 RPM—1/2 HP POWER SAW

## RIPS—CROSSCUTS

CUTS A FINISHED 2x4 LIKE A KNIFE THROUGH BUTTER

COMPARES TO SAWS SELLING UP TO \$49.50 1998 Complete with 5-1/2" Blade

A rugged, professional type, adjustable saw. Will cut any angle from 0 to 45°. Has an adjustable (0 to 6") rip fence. Safety-trigger switch on handle. Full 1/2 HP Universal AC-DC, 110-120 Volt, 60 cycle motor. Weighs only 6 1/2 lbs. Thousands already sold. Your satisfaction guaranteed.

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## BUILD YOUR OWN DIVING LUNG—SAVE

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With 2 Bottles (1 hour time) 4595

FREE CATALOG Has latest info on Diving Equipment. Plus an illustrated and described article on "How to build your own Diving Lung". \$150.00 value

## CORNELIUS AIR COMPRESSOR

A 3 stage, 1500 PSI air compressor. Has a built-in 1/3 HP, 27 volt, 20 Amp DC motor. Compressor will deliver .4 cubic feet of air per minute. Has a built-in safety valve. Can be adapted to fill underwater diving tanks, spray tanks, for inflating, etc. NOW 3295

## GENERAL ELECTRIC AIR COMPRESSOR

A 2 stage AC or DC type compressor. Develops 1000 PSI. Has a 1/3 HP, 27 Volt, series wound motor. Ideal for spraying, inflating, painting, etc. 2295

## PALLEY AIR TANKS

G-1 Type. Stainless Steel. Rust & shatterproof. Pressure tested up to 400 PSI. Has 1/4" pipe ports. 12"x24" 1295 22 cu. ft. capacity. 5" dia., 19" long. 1095 38 cubic ft. cap. 7 1/2" dia., 9" long. 1495

AIR HOSE For use on underwater air mask. Top quality latex. Built-in non-return valve and mouth piece. All NEW!!! 6

Order From This Ad. Pay by M.O. or check. 1/3 deposit with C.O.D.'s. All Prices FOB Los Angeles.

## NEW AIR MATTRESS for ALL STATION WAGONS

## CONVERT YOUR WAGON TO A FULL SIZE DOUBLE BED

A snug, comfortable, durable air mattress that makes a FULL SIZE Double BED! Made of heavy duty, laminated vinyl plastic with double welded seams. Extremely lightweight. Excellent for camping, sunbathing, etc. The safest way for the kiddies to ride. Available for Nash Rambler, Pontiac, Buick, Ford, Mercury, Plymouth, Chevrolet. Models 1952—1956. Specify. 2395

## GENUINE AN6530 ARMY AVIATORS GOGGLES

Has precision ground, interchangeable lenses. Your choice of 3 lens colors—Clear, Amber or Green. Frames are rubber covered with soft chamois lining and built-in, non-fogging lens ventilators. Adjustable nose bar and elastic headband. WINDPROOF—DUSTPROOF! Genuine Air Corps Surplus. NEW Give lens color choice... 249 EXTRA LENSES—colors above. 100 PR

## CAMP ACCESSORIES

PORTABLE, FOLDING SHOVEL—With a 20 inch hardwood handle. Blade will fold to form a pick. Ideal for gardening or use in an emergency. 175

NEW MACHETE 22" Vanadium Steel Blade with a 5" hardwood handle. Comes with rugged belt sheath. 198

BOLO KNIFE Top quality steel blade, 15" long. Comes with belt sheath. Ideal for clearing brush. 198

ARMY PICKMATTOK Small, easy to use and pack. Has 12" steel head with pick on one side, mottok on other. 16 1/2" hardwood handle. With case. ONLY 198

## ARMY CANTEEN CUP AND BELT

A one quart canteen and aluminum cup fit into the insulated canvas cover. The web type pistol belt has grommets to hold canteen and carry other gear. Ideal for Scouts. 275

## WATERPROOF ARMY BEDROLL

Large 80"x96" heavy duty duck canvas bedroll. Has roomy pockets in each end to hold extra gear. An ideal enclosed ground cloth for a sleeping bag or air mattress. Complete with (3) 8ft. web straps and buckles. A SURPLUS BUY! 495

## NAVY WADE SUITS

Covers the entire body from the neck down. Protects you from mud, water, etc. Originally designed for overboard work by the Navy. Made of heavy duty rubberized canvas with vulcanized seams. Has built-in rubber boots and gloves. Comes in sizes: Small, Medium & Large. \$35.00 Value. 895

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Ideal for Fishing or Hunting. Made to Gov't specs. Reconditioned and ready-to-use. Supply Limited.

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5-6 MAN NOW 5995

HAND AIR PUMP 395

COLLAPSIBLE OARS 125 EACH Write Today for FREE FOLDER No. C8 on complete line of Camping Equipment.



## How They've Laid Wires to Europe

[Continued from page 256]

waves, until each section of the cable was in place.

On June 28, 1955, the *Monarch* steamed out of Clarenville, Newfoundland, with 200 miles of the cable from the Newton factory. Detouring an iceberg, she payed out this section to the edge of the continental shelf, where the end was marked with a bright yellow-and-red buoy. Then she sailed for England to fill her wells with 1,250 miles of deep-sea cable. Back at the buoy, her "jointers" spliced the cables—a seven-hour trick. Then she headed for Scotland, paying out cable day and night. At times her Fathometer recorded submarine canyons more than two miles deep. These were detoured so that the cable would not be suspended from cliff to cliff.

Down in the Caribbean Sea, 2,000 miles distant, trouble was brewing that made the *Monarch's* voyage a "men against the sea" saga. The probable course of Hurricane Ione had been charted, and it was expected to overtake the *Monarch* just as the ship reached Rockall Banks off Scotland. Actually, the last 30 miles were laid in a 40-mile gale. Marking the cable with a buoy, Captain J.P.F. Betson headed full steam for London, to pick up the last 500 miles of cable.

**When the *Monarch* returned** to Rockall Banks, with Bill Thompson aboard to see his dream come true, a 100-mile wind howled where the buoy should have been. After the seas calmed, the *Monarch* began grappling runs for the lost cable. Thirty hours later, on the sixth run, the grapples hooked onto the cable  $4\frac{1}{2}$  miles from its end.

The new cable was spliced on, and

the *Monarch* headed again for Scotland.

On September 27, 1955, Thompson listened for the first time to voices boosted along the ocean floor from North America. "It works!" he exulted.

The westbound cable will be laid this summer, finished this fall. Technicians say it will take about six weeks of testing to have the new cables functioning at top efficiency.

**Among the tests** to be made is a "roll call" of the repeaters, each of which has built into it a quartz crystal that responds with an identifying "beep." By this means the technicians can locate immediately any "catastrophic failure"—the term they use for a faulty repeater, because the cost of grappling for the cable and splicing in a new section would be at least a quarter-million dollars!

Even before the westbound circuit is completed, Bell System's experts will be preoccupied with two other "firsts." One is the 750-mile Alaska phone cable to be laid this summer from Port Angeles, Wash., to Ketchikan, to connect with the U. S. Army Signal Corps cable system. After that comes what the cable men call the "Big Job," a 2,200-mile phone cable from California to Honolulu.

Meanwhile, the Atlantic cable will serve all of Europe. Seven of its 36 circuits will be extended by relays to Paris, Amsterdam, Frankfurt, Brussels, Copenhagen and Berne. A call will cost the same as one by radiophone: \$12 for three minutes in the daytime, \$9 at night. Thompson expects the circuits to work around the clock, and hails the new cables as "another milestone in the art of telephony." END

## NEXT MONTH... Outdoor Furniture That You Can Build

WANT an easy chair that's really designed for back-yard relaxing? Need a table of really generous proportions—and seating capacity—when you have outdoor barbecues?

There's still time to build items like

these before you settle down for a happy and lazy summer in the back yard. Articles in PSM for June will show you how to build a handsome circular picnic table and a relaxing chair that you'll be proud to own—and snooze in.



**This One**



**KTWT-BOK-U9RD**





Biggest value ever!

## Sensational new heavy-duty saw

—only **\$69<sup>50</sup>**

At last—true heavy-duty design and precision engineering in a *professional quality* 6½" saw!

Porter-Cable's revolutionary new Model 146 has the *capacity* you need—makes every cut it takes to build a house! It slices through 2" dressed lumber—even at a 45° angle—with speed and power to spare. It does everything that bigger saws can do—does it *easier*—does it all day long without a whimper.

Model 146 is light and handy—just 11 lbs. of perfect "feel" and balance. And just check its features! Full ball-bearing construction, telescoping guard, exclusive new calibrated depth gauge, famous Porter-Cable Kick-Proof Clutch, husky 9-ampere Universal motor (1.3 equivalent h.p.) and many, many more.

See the new Model 146 at your dealer's *now*—or mail the coupon below. At only \$69.50, it's the saw "buy" of the century!

SEE YOUR DEALER — OR MAIL COUPON TODAY!

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Yes, send me a complete catalog sheet on the Model 146 Heavy-Duty Saw, and the name of my nearest dealer.

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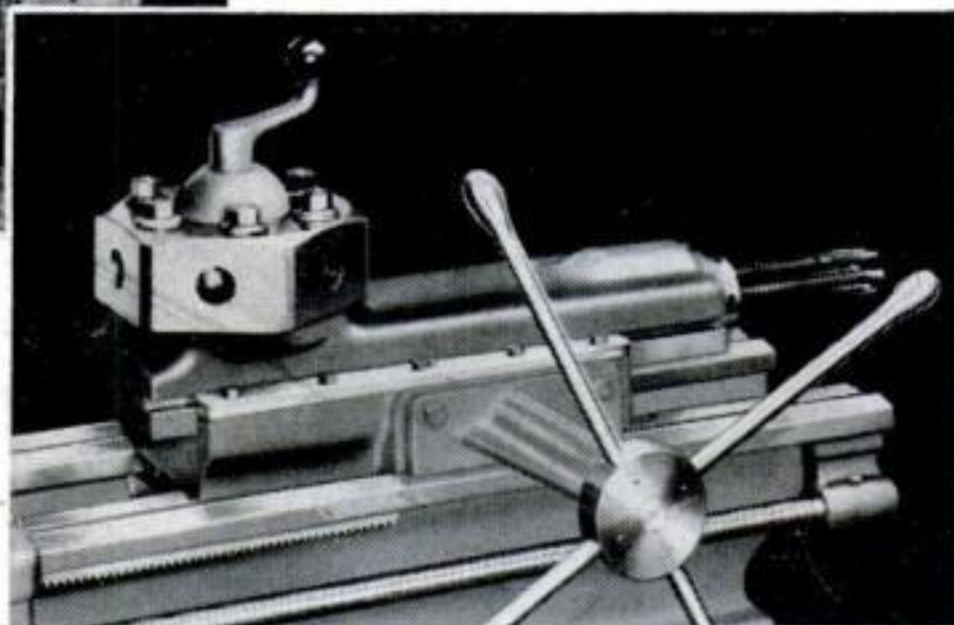
**KEEP CLOSE-TOLERANCE MACHINING EFFICIENT!**

# South Bend PRECISION TURRET LATHES

**South Bend 2-H Precision Turret Lathe—1" collet capacity, 16¼" swing, 96 power turret feeds, 48 cross slide feeds, 48 carriage feeds, 48 thread cutting feeds.**

**Base Price \$3350**

South Bend Precision Turret Lathes keep efficient the machining of small duplicate parts. Their remarkable accuracy and positive controls simplify the holding of close tolerances with only normal machine handling care. Finishes are commonly produced that otherwise would require additional operations. Simplicity of tooling makes job changes quick and economical. Wide ranges of power feeds and thread cutting feeds assure maximum efficiency on every job. They are particularly suited for second operations. Sizes available include: 1" collet—16" swing; 1" collet—13" swing; 1" collet—10" swing. Priced from \$1601. Time payment terms can be arranged. Only 3¼% annual interest on original unpaid balance.



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South Bend Turret Attachments are available for tooling 9", 10", 13" and 16" swing South Bend Lathes for repetitive operations. Precision built for precision work, their rigidity and accuracy permit maximum feeds and speeds. Prices of hexagon bed turrets range from \$273.00 to \$698.00. Square Turret Tool Blocks are priced from \$41.50 to \$91.00. Write for Attachment Catalog giving full information on South Bend Turrets and the complete line of South Bend Attachments and Accessories.



PLEASE SEND INFORMATION CHECKED:



☐ 9" and 10" BENCH LATHES



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Yes! You, yourself, can fit this amazing GASOLINE ATOMIZER onto your car in as little as 20 easy minutes! And it is guaranteed to pay you back your full purchase price, in gas savings alone, in the first 3 to 4 short months that you use it.

By **RICHARD JOHNS**

Mr. Car Owner! How would you like to have the driving thrill of your life next weekend?

Picture this yourself! Next weekend go down to your car—the same tired car you've been driving for years. You've made one simple change to that car, so easy your 16-year-old son could do it! But now, when you turn on the ignition, a modern miracle of engineering science comes to life under your hood.

From the very first moment, you'll see and feel the difference in that engine. That engine will hum with new, throbbing power. When you release the emergency brake, your car will glide out of its parking space . . . roll down the street with your foot hardly touching the pedal. Every 30 or 40 seconds, give that car an extra shot of gas . . . feel it spurt ahead . . . test the new power that's singing under your foot!

We ask you to pull up to another car at the stop light, of approximately the same year and make as your own! Wait until the light changes to green. Let the other car start first. Wait till the other car gets half way across the street. And then slam your foot down on the gas pedal!

Before that other car has even crossed the street, you will have caught up with him. For one brief second, you and that other car will race fender to fender. Then you will flash away from him . . . you will leave him a full block behind . . . you will look in your rear view mirror and see the startled look of amazement in the other driver's eyes!

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Save this guarantee section. It authorizes you to try this amazing new MINI-SUPERCHARGER for a full four months ENTIRELY AT OUR RISK! This device must save you — on gas alone — EVERY SINGLE CENT OF THE MONEY THAT YOU PAID FOR IT — OR YOUR FULL MONEY WILL BE REFUNDED! This offer is good for a full four months! It is probably the most amazing offer in car history! You have nothing to lose! ACT TODAY!

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## TEST THIS NEW POWER A HUNDRED DIFFERENT WAYS!

But this is just the beginning! Test this equipment for one full month—entirely at our risk! Use it to flash away from other cars . . . spurt up the steepest hills . . . actually pass other cars in 2, 4, 6 and even 8 seconds LESS than you could have done formerly!

See the enormous gas savings it gives you at high speeds! Prove to yourself that at 50 . . . 60 . . . even 70 miles an hour, your foot is still half-way up on the pedal—you still have all the reserve power you need to get out of any emergency on the highway!

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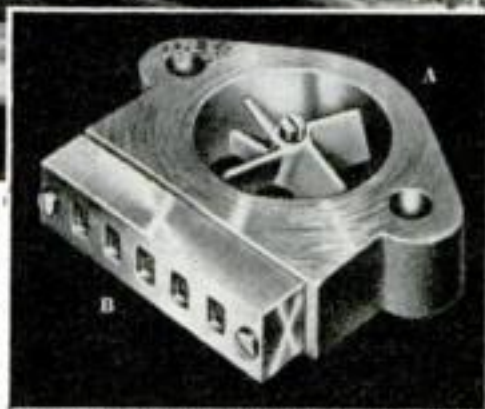
## HOW DOES THIS PRODUCT GIVE YOU SUCH TREMENDOUS NEW POWER?

And you get all this performance—and more—from a small, polished machine of bronze and aluminum that you can hold in your hand! Here's why:

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**YES!** This amazing "MINI-SUPERCHARGER" gives you as much as 15 more horsepower from your engine! Gives you the gas economy you've dreamed about for years! This Power Booster is patented after superchargers selling for as high as \$600. Its whirlwind propeller (A) breaks up the raw, unburnt gas that your engine is wasting today . . . gives you blazing new power from every drop! Its emergency breather valve (B) draws fresh clean air into your engine . . . forces that engine to breathe deeper . . . push harder . . . pile up more mileage from every gal-



lon you buy! No wonder dozens of leading car magazines call this the "money saving discovery of the year." Test this amazing gas-saver yourself — without risking a penny! The thrilling facts are on this page!

not explosive. If you accidentally drop a lighted match into a bucket full of gasoline, the chances are 10 to 1 that that gasoline will actually put out that match. But simply mix that same bucket full of gas with the proper amount of air, and you will have enough explosive power to drive a ten ton truck!

This machine SUPER-MIXES . . . SUPER-VAPORIZES . . . SUPER-ATOMIZES your gas in exactly that way! Squeezes the hidden power out of that gas! Mixes that gas with much greater volumes of air! Makes that gas more explosive in your engine!

Men have paid up to \$600 for Superchargers! This is a MINI-SUPERCHARGER — easier to install — less expensive! But still the only power product you can buy with all these tremendous advantages:

1. Install it yourself, in just 20 minutes, even if you never picked up a tool before in your life!
2. Never needs further adjustments, for the life of your car!
3. Takes up no room in your car, makes no "souped-up" noise!

## SO EASY TO INSTALL THAT EVEN YOUR 16-YEAR-OLD SON CAN DO IT!

Step 1. Locate Air Cleaner and Carburetor on top of your engine. Take an ordinary wrench and loosen the two or three bolts that hold the carburetor to the engine!

Step 2. Lift up the carburetor. Put MINI-SUPERCHARGER in place. What could be easier?

Step 3. Replace carburetor. Now turn on your engine! Then get in and take the most thrilling drive of your life!

## TRY IT ENTIRELY AT OUR RISK

This MINI-SUPERCHARGER (U.S. Patent No. 2,409,937) sells for only \$11.95 for most cars or \$14.95 if your car has a special four barrel carburetor. This is your total cost—there is no installation fee! And, most important of all, we guarantee that you will save this full purchase in gas bills alone—in the first 3 to 4 months that you own this device.

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☐ \$11.95 (My car does not have a four-barrel carburetor.)  
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I understand that it must do everything you say or my full money back! Also send me as your Extra Gift Premium, the Free Dial-O-Magic Trouble-Spotter Chart. This is mine to keep even if I return the MINI-SUPERCHARGER.

MAKE OF CAR \_\_\_\_\_ YEAR \_\_\_\_\_

MODEL \_\_\_\_\_ 4 DOOR OR 2 DOOR \_\_\_\_\_

6 CYLINDERS \_\_\_\_\_ STRAIGHT 8 \_\_\_\_\_ V-8 \_\_\_\_\_

STANDARD TRANSMISSION \_\_\_\_\_ AUTOMATIC \_\_\_\_\_

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SAVES YOU UP TO \$250 ON REPAIRS THIS YEAR ALONE!**

Think of it! With a 20-second flick of your finger, you can actually save up to 50% of the money you're throwing away on repair bills right now! You can save up to \$250 this year alone — without special tools, even if you never picked up a screwdriver before!

Here is a complete CAR-REPAIR-MANUAL-AT-A-GLANCE, that tells you instantly what to do when your engine won't start, or heats up, or sputters and stalls. What to do when it leaks water, chugs on the hills, burns oil. What to do when your battery won't charge, your oil pressure drops, your clutch slips, when you're bothered by squeaks, groans or rattles.

Here are professional, 20-second secrets that show you how to prevent rust from ruining your radiator; get quicker starts in winter; keep your engine from overheating even in the hottest weather. How to keep your upholstery spotless; your

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Yes! Simply flick the dial, and instantly you learn how to avoid dangerous accidents in bad weather; check battery and spark plugs yourself and save \$5 tune-up charge; prevent major \$40, \$50 and \$60 repair bills. How to stop engine troubles the very moment they start; lengthen your car's life, add \$150—\$200—even \$250 to the trade-in value of your car!

It's exactly like having a first-rate mechanic at your elbow 24 hours a day! But remember, this is your only chance to get this amazing DIAL-O-MAGIC TROUBLE SPOTTER as a FREE extra gift! An extra added FREE bonus that is yours to keep even if you return the MINI-SUPERCHARGER!

But our supply is limited! ACT TODAY!

DEALERS! DISTRIBUTORS! CASH IN ON HUGE, FULL PAGE NEWSPAPER AND TELEVISION CAMPAIGN! WRITE FOR FREE DETAILS!



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for more pure  
pleasure—have a  
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**No other cigarette  
tastes so rich, yet  
smokes so mild!**

YOU BET I'D  
WALK A MILE FOR  
A CAMEL!



No other cigarette gives you the special kind of pleasure that's yours in Camels. So many modern smokers prefer the exclusive Camel blend of costly tobaccos that this cigarette is by far America's first choice. Make the 30-day Camel Mildness Test. See how Camels' real mildness and rich flavor give you the *full* enjoyment you want in a cigarette.